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SPECIAL ISSUE

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON
Volume 29, No. 6 • November / December 2005

Evolution and the ID Wars

- Mark Perakh
- David Morrison
- Lawrence Krauss
- Jason Rosenhouse
- Sean B. Carroll
- Elie Shneour
- Lawrence S. Lerner

Published by the Committee for the Scientific Investigation of Claims of the Paranormal

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The SKEPTICAL INQUIRER (ISSN 0194-6730) is published bimonthly by the Committee for the Scientific Investigation of Claims of the Paranormal, 1310 Sweet Home Rd., Amherst, NY 14228. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $4.95. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or MasterCard. Canada Publications Mail Agreement No. 41153509. Return undeliverable Canadian addresses to: IMEX, P.O. Box 4332, Station Rd., Toronto, ON M5W 3J4.

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Subscriptions and changes of address should be addressed to: SKEPTICAL INQUIRER, P.O. Box 703, Amherst, NY 14226-0703. Or call toll-free 1-800-634-1610 (outside U.S. call 716-636-1425). Old address as well as new are necessary for change of subscriber's address, with six weeks advance notice. SKEPTICAL INQUIRER subscribers may not speak on behalf of CSICOP or the SKEPTICAL INQUIRER.

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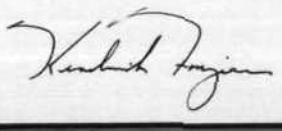
Editor's Note

Evolution and the ID Wars

We devote the core of this issue to Evolution and the ID Wars. The "Intelligent Design" movement is the most pernicious pseudoscience of our time. It seeks to undermine the teaching of evolution, at a minimum, but at its root is a broad attack on the nature of science itself—science's insistence on evidence, its unrelenting testing of hypotheses, its tradition of first airing new propositions before knowledgeable colleagues, its requirement of peer-reviewed scientific publication, its skeptical scrutiny of all new ideas, its error-correcting mechanisms and welcome acceptance of new ideas that better fit better evidence, its wonderful and imaginative creativity. In its place, ID advocates would give equal time to an ancient and long-discredited faith-based idea with zero scientific evidence. They would bypass all of science's institutional mechanisms that painstakingly sift unsupported ideas from well-supported ones and that are at the core of what science is all about.

The ID advocates are well supported and crafty. They turn scientific arguments on their heads. They paint themselves as the open-minded inquirers. They just want to be "fair." They just want to "teach the controversy." They in fact create the controversy by publicly advancing outrageously misleading, often outright false, statements about evolution. Then when scientists respond to correct them, the IDers organize vast letter writing campaigns and point to the "controversy" that ensues as evidence that it should be taught in the classroom. They disingenuously pretend that the resulting controversy is about science, not about religion and culture. They tirelessly work to put likeminded people on local school boards. They seek, and get, political support. They claim that it is science advancing dogma, not themselves. They pretend they want only to give the "alternative" view. The media responsibly report on the "controversy" and allot 50-50 space and time to each viewpoint, falling right into the ID advocates' hands. It has been a remarkably successful political and public-relations strategy, and they keep waging the war on public battlegrounds that continually put science to the disadvantage.

The main articles, commentaries, reports, and statements in this issue deal with all these issues and many others. We asked notable scientists and scholars knowledgeable about this debate to present their ideas. They analyze intellectually the ID argument, they propose better ways for presenting the scientific case to the public, they discuss why scientists get so angry at ID proponents, they provide poll results of Americans' beliefs about evolution and creationism, and they comment knowledgeably about those beliefs. And one, biologist Sean B. Carroll, in an excerpt from his new book, *Endless Forms Most Beautiful: The New Science of Evo Devo*, presents an overview of some new evolutionary science, combining embryology with evolutionary developmental biology, that has provided remarkable new advances and insights into evolutionary processes over the past two decades. This reminds us—importantly, I think, as would even a quick perusal of nearly any current scientific journal—that the science goes on, advancing, illuminating, producing exciting new understanding, even while a public mostly ignorant of it dithers over and argues about the modern-day equivalent of how many angels dance on the head of a pin.



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'Psychic Swindler' in San Antonio Convicted of Theft by Coercion

Jennifer Nicole Evans, the San Antonio, Texas, fortuneteller whose crimes were chronicled in an article in the May/June 2005 issue of SI ("Psychic Swindlers" by Amy Davis), was found guilty of eight counts of theft by coercion and sentenced to twelve years in prison. In addition, the jury also decided that Evans must pay $213,000 in restitution to her victims.

Ms. Evans, who performed her services under the name "Miss Brooks," "sobbed after the judge read the sentence" and "yelled an expletive at the lead prosecutor who tried the case [Karen Betancourt, an assistant district attorney for Bexar County, Texas]," according to a report that appeared on the Web site MySan Antonio.com on July 15, the day of Evans's conviction.

Psychic Jennifer Evans covers her face while being arrested in San Antonio, Texas. Evans was later convicted of theft by coercion and sentenced to prison.

During the course of the trial, ten of Evans's victims testified that she had used the threat of illnesses such as cancer and other bad fortune that would befall their loved ones if they didn't follow her instructions. Those instructions invariably included handing over money and purchasing merchandise and services for Evans and some of her relatives, all to clear away the curses. She harassed them by telephone until some of them had cleared their bank accounts and were far over their heads in loan and credit-card debt.

A letter we received from Susan D. Reed, the Criminal District Attorney for Bexar County, states: "The conviction of self-proclaimed psychic/spiritualist Jennifer Evans, age twenty-four, in Bexar County, Texas, for scamming individuals seeking out her assistance sends a clear message to those who prey upon vulnerable victims in [their] community that they will be held accountable. These victims of Ms. Evans believed she had the psychic power to harm or protect from harm their loved ones, so much so that they were willing to give her money to keep their families safe from her threats. While the prosecution was difficult because the victims voluntarily gave the money to remove her gypsy 'curse,' the jury's verdict of a twelve-year prison sentence is a strong indication that the laws of our great state protect the innocent from schemes, scams, and swindles."

Amy Davis, the troubleshooter reporter who authored the aforementioned article for *SI*, then with News 4 WOAI in San Antonio, said of the trial's outcome: "I really wanted to sit in and watch the trial. I felt so much a part of the case. But since I am now living and working in Houston, I had to keep up with the latest developments online. I was actually prepared to be disappointed. I expected her to get probation. The fact that she didn't reminded me why I love my job. . . . Prosecutors showed our undercover video of Evans in a session with our producer during the trial. I think once jurors actually saw Evans's antics, they had to understand what she was doing was so much more than fooling naive pawns. I am thrilled she'll spend the next twelve years behind bars."

The outcome of the trial was uncertain, because while Evans could have been sentenced to as much as ninety-nine years behind bars, she also could have been given only probation, due to the fact that she formerly had no criminal record. Betancourt's successful prosecutorial tactic had been to stress the idea that Evans had, in effect, threatened people's well-being in order to extort money from her clients, while Evans's defense attorney, Roy Berrera Sr., had asked for probation for his client, because her victims had given the money to her voluntarily.

D.A. Reed's statement concludes: "The psychic scam may be a long tradition for the gypsy culture, but the law clearly protects us from the thief who uses words of coercion and alleged power of the paranormal to secure the life savings of the citizens of our community."

—David Park Musella

David Park Musella is an editorial assistant with SKEPTICAL INQUIRER.

Plane Crash Survival: Miracle or Skill and Science?

On August 2, 2005, amid heavy rain and lightning, Air France Flight 358 from Paris, France, to Toronto, Canada, crashed. The plane touched down, and the passengers cheered, forgetting that just because the airplane's wheels hit the tarmac does not mean the flight is over. The plane struggled to slow down but failed, overshooting the runway by 200 yards and eventually slamming into a ravine. Flames emerged from the aircraft body as the twelve crew members evacuated the 297 passengers.

Most of the passengers were out of the plane in less than a minute, many of them taking time to grab their belongings and taking photographs of dazed fellow passengers and the smoldering wreckage (these would later be sold to evening news programs). The copilot searched the plane for any remaining passengers before exiting. When the smoke cleared and the passengers were counted, every single person was found to have made it out alive.

Canada's transportation minister, Jean Lapierre, proclaimed that the 100 percent survival rate was "nothing short of a miracle." Passengers, pundits, and the news media quickly adopted the "miracle" tag, with hundreds of headlines touting the miraculous nature of the crash. London's *Daily Mail*, for example, called it "The Miracle of Toronto" while Reuters called it "The Toronto Miracle Crash." *Toronto Sun* columnist Mike Strobel wrote a piece lamenting the news media's overuse of the word *miracle*. "In the news game, we use it to death," he wrote. "Our [*Toronto Sun*] clipping file lists the word 240 times this year alone and 239 times, it did not fit. Except today. Miracle Flight 358. Paris to Pearson. We all saw that awful black smoke. A funeral pyre, surely. . . . No one gets out of that alive."

The "miracle" label was perfect. It was a great news handle and a great silver lining in a dark storm cloud. However, it doesn't fit the circumstances of Flight 358. Aviation experts said that while the outcome of the crash was certainly fortunate, there was little miraculous about it. Mark Rosenker of the U.S. National Transportation Safety Board (NTSB), was quoted in an MSNBC article as saying that "There is this myth out there that says if you're involved in a catastrophic aircraft accident the odds are extremely low. [In fact], the odds are extremely high." According to an NTSB study of 568 crashes between 1983 and 2000, only five percent of passengers were killed; the remaining 95 percent escaped unharmed or without life-threatening injuries. In another study of more serious crashes, the odds were better than 50/50 that passengers got out alive. And crashes that occur on the ground, as Flight 358 did, often have very high survival rates.

In modern hyperbole a miracle often simply means "unexpected good fortune" from the labeler's perspective. Journalists, preferring sensationalism to statistics, saw the burning metal wreckage and incorrectly assumed the crash was unsurvivable without consulting experts. The traveling public, who already dramatically overestimate the dangers of air travel, have been primed by a fear-mongering news media to assume the worst.

The fact that all the passengers survived is almost certainly due to science,

Center for Inquiry Granted Representation at the United Nations

The Center for Inquiry–*Transnational* (CFI), which is the parent organization of the Committee for the Scientific Investigation of Claims of the Paranormal (publisher of the SKEPTICAL INQUIRER), has been granted "special consultative status" as a nongovernmental organization (NGO) under the United Nations Economic and Social Council.

This entitles the Center for Inquiry to designate official representatives to U.N. headquarters in New York and U.N. offices in Geneva and Vienna. The Center for Inquiry can participate in conferences and briefings open to NGOs, and generally present the scientific, skeptical, and secular humanist perspective to the international community.

The Center for Inquiry maintains centers and communities in Amherst, New York, New York City, Los Angeles, Tampa, and communities in fourteen other cities in North America. It also has Centers in Germany, France, Spain, Poland, Russia, Peru, Argentina, Egypt, Nigeria, Uganda, Kenya, India, Nepal, and New Zealand, and is in the process of establishing a center in China.

Paul Kurtz, chairman of CFI, commented, "As the planetary community faces unprecedented challenges in the future, it should be guided by humanist values and scientific rationality. In an age of clashing fundamentalisms and unprecedented missionary evangelism, the commitment to secular government and freedom of conscience should be heard. In the coming century of bio-genetic science, scientific inquiry offers great opportunities for humankind and should be encouraged, not censored. Scientific rationalism needs to be present in deliberations at the U.N."

The New York office of the Center for Inquiry, headquartered at Rockefeller Center, will coordinate its U.N. activities.

The wreckage of Air France Flight 358 at Toronto's Pearson International Airport. Reuters/Frank Gunn/Pool (Photo via NewsCom)

skill, and circumstance. Attributing the passengers' survival to a miracle is an insult to the bravery, skill, and experience of the Flight 358 crew, who trained for years to handle just such emergencies. By all accounts, the Air France crew acted quickly and professionally during the emergency. They made sure that all passengers were buckled in for the landing and evacuated promptly.

The *miracle* designation also ignores the countless engineering safety measures and devices built into the Airbus A340. After all, the airplane design is the result of decades of safety engineering. Scientists help make aircraft materials stronger and lighter, and crashes more survivable (designing impact-resistant fuel tanks, for example, and flame-snuffing foam). After a century of flight, airplanes are safer than they ever have been, and remain far safer than autos on the nation's highways.

Less than a year earlier, on October 19, 2004, another "miracle crash" occurred. A commuter plane carrying doctors to a medical conference took off from St. Louis and crashed in a wooded area near Kirksville, Missouri. Thirteen passengers and crew were killed; the only survivors were hospitalized but sustained relatively minor injuries such as broken bones. Dr. Charles Zeman, director of trauma services at Northeast Regional Medical Center, said, "We see car accidents with worse injuries coming in here every week. This is truly a miracle." Zeman's comment on the miraculous nature of the accident was quoted in a CNN headline story.

The comment, though perhaps offhanded, is interesting because it demonstrates the low standard of modern miracles. Using the term *miracle* to describe this crash seems strange, given that nearly everyone aboard the crashed plane died a horrible and fiery death. Random chance and safety engineering accounts for the fact that the two survivors avoided life-threatening injuries: the pair was seated next to the emergency escape door, which popped open on impact.

The 100 percent survival rate on Flight 358 was fortunate and wonderful, but it was not an accident, nor was it a miracle; it was mainly the result of good preparation, sound science, and modern technology. When science saves lives, it deserves credit.

—Benjamin Radford

Benjamin Radford is the managing editor of the SKEPTICAL INQUIRER *magazine.*

'Winking Jesus' Statue: Mystery Solved!

On July 28, 2005—according to a Hoboken, New Jersey, street "preacher"—a plaster Jesus statue he had installed as part of a sidewalk shrine suddenly opened one eye. "Some believe it is a miracle," reported the Associated Press. "Others believe someone doctored the sculpture."

The partially blind, unemployed Catholic, named Julio "Sly" Dones, had retrieved the two-foot-tall, Sacred Heart of Jesus statue from a garbage bin a year before. He had made it the centerpiece of a shrine of Madonnas, crucifixes, and cherubs that he had set up outside a housing project on Jackson Street. Dones says that while he was cleaning the "sleeping" figurine, which is visibly scuffed and has peeling paint, it opened its right eye.

Stories soon also spread of the statue blinking its right eye, turning its head,

The "Miracle Winking Jesus" statue of Hoboken, New Jersey. Photo by Bryan Smith/ZUMA Press. Copyright 2005 by Bryan Smith (Photo via NewsCom)

and streaming tears. These effects were not verifiable, however, and in any case, could have been due to the imaginations of what the New York *Daily News* called the "enraptured witnesses." As well, statues left outdoors might trickle moisture. The effect of the wide-open eye, however, was there for all to see (as shown in the accompanying photograph).

A "carnival atmosphere" attended the "*Winking Jesus*," *and reactions were* varied. A traffic attendant said she regarded it as "an absolute miracle," and a masseuse promised she would "start going to church from now on." But one fourteen-year-old girl shook her head and stated, perceptively, "It's just a sculpture. I think somebody just scraped its eyelid off."

Analysis of a number of press reports and photographs demonstrates many persons received mistaken impressions and made erroneous statements regarding the alleged phenomenon. For example, the statue's eyes were never closed, as many thought; rather the figure previously had "half closed eyes."

Moreover, as shown by an electronic, high-resolution photo which I studied in close-up detail with the assistance of SI art director Lisa Hutter, the blue eyes are not painted plaster. Instead, they are vitreous orbs, probably glass, embedded in the face. These give the eyes significant added realism (except that Jesus *probably would not have had blue eyes*), and, indeed, they are the secret behind the opening-eye effect.

Portions of the upper and lower right eyelids have been broken off, their irregular edges providing unmistakable evidence of this, consequently exposing more of the eye—notably the iris. The breakage may have occurred when the statue was being cleaned, or it may have happened previously and only been noticed later.

Rev. Michael Guglielmelli of St. Francis Roman Catholic Church, which Dones attends, was cautious about the reputed miracle, but he stated: "As a priest, I'm always open to everything. Whatever lets a person pray is good." This end-justifies-the-means attitude stands in sharp contrast to an anti-idolatry story told in the fourteenth chapter of Daniel (found in Catholic but not Protestant Bibles).

The story features an idol of Bel that apparently devoured huge quantities of *food and wine and won over King Cyrus* to worship of the idol. However, Daniel sifted ashes on the floor of the sealed temple and so recorded the footprints of the priests and their families who used "secret doors" to enter and devour the offerings. As he had reasoned, the idol was only made of brass-covered clay and "never ate or drank anything." Neither, he might have added, do plaster statues move or weep.

—Joe Nickell

Joe Nickell is CSICOP's Senior Research Fellow.

Fullerton Underpass: The Lost Episodes

When the story broke in April about hundreds of *people visiting the* Fullerton underpass at the Kennedy Expressway in Chicago, I was a bit embarrassed. My hometown usually lags well behind my current home, Los Angeles, when it comes to wackiness. So when I stopped by the site one hot, July day, I was surprised to discover a set of horrible injustices, an epidemic of oversights, a heinous crime spree of omission.

Oh, sure, the good-intentioned visitors had created a large shrine to a water-stain simulacrum of the Virgin Mary herself, but they also shunned many of the *other* miraculous stains and images that litter *the very same underpass.*

How could such obvious likenesses be overlooked? Why would people pay tribute to an alleged virgin, while ignoring the accompanying icons that also hold great significance (at least to some)?

For example:

- Where are the nature lovers to build *shrines to the magnificent animals* who inhabit the underpass? Who will honor the prehistoric bird (figure 1), the roadrunner (figure 2), the swordfish (figure 3), the jellyfish (figure 4), and the squid (figure 5)?
- Where are the TV fans to honor Homer (figure 6) and Bart (figure 7) Simpson, Huckleberry Hound (figure 8), and an angry Kramer (figure 9) from *Seinfeld?*
- And why have the legions of Satanists who live in our society ignored the Grim Reaper (figure 10), and the very devil himself (figure 11)?

Open your eyes, Chicagoans! For there is none so blind as he who will not see!

—James Underdown

James Underdown is the executive director of the Center for Inquiry–West in Hollywood, California, and the chair of the Independent Investigations Group.

Photos by James Underdown, except the photo of the author at the "Virgin Mary Shrine," by V. Munoz.

Virgin Mary Shrine

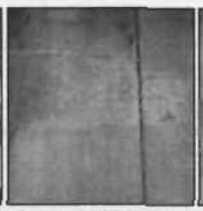
Figure 1. Prehistoric Bird

Figure 2. Roadrunner

Figure 3. Swordfish

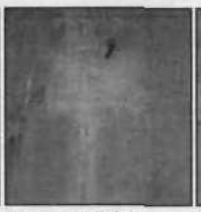
Figure 4. Jellyfish

Figure 5. Squid

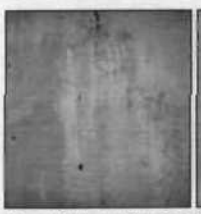
Figure 6. Homer Simpson

Figure 7. Bart Simpson

Figure 8. Huckleberry Hound

Figure 9. Kramer from *Seinfeld*

Figure 10. Grim Reaper

Figure 11. Devil Faces

Teen in Aruba, Others Still Missing Despite Psychics

Natalee Holloway (left, with her mother) vanished May 30 while on a five-day senior trip to Aruba with more than 100 classmates and seven adult chaperones. Photo by Courtesy Beth Twitty/ZUMA Press. Copyright 2005.

Alabama teenager Natalee Holloway disappeared in the early hours of May 30, 2005, while on vacation in the Dutch Caribbean island of Aruba. Thousands of people joined the search, including tourists, Aruban police, U.S. Marines, and FBI officials. The island's ponds, beaches, ravines, forests, and landfills were all scoured, as Beth Holloway Twitty, Natalee's mother, consulted a psychic and distributed flyers around the island. Tim Miller, leader of EquuSearch, an equestrian search team working to find Holloway, said that psychic information was both plentiful and invariably worthless. "To be honest, in Aruba we had 7,000 calls a day from these people. Nothing ever worked." Several people were arrested in connection with the disappearance, all but one later released; as of this writing, no one has been formally charged in her case and Holloway remains missing.

As the search for Holloway passed the two-month mark, more and more people wondered why psychic detectives hadn't located the missing teen. After all, dozens of people—featured on prime-time cable and broadcast television shows—claim to help police locate missing persons and solve crimes. Larry King and others routinely tout the amazing powers of "psychic detectives" such as Noreen Renier, perhaps America's best-known psychic. (See Gary Posner's review of Renier's recent book in the September/October 2005 issue of SI.)

On her Web site, Renier posted "An Open Letter to those who are concerned with the missing girl in Aruba, Natalee Holloway." The psychic, who claims an impressive track record and "uncanny success in finding missing persons," states that she received "countless e-mails and phone calls asking me to find Natalee Holloway." Renier states that she has not tried to help locate the teen because no one specifically invited her to: "I have to be invited to work on the case by either the family or the detectives." Renier's hesitation to inject herself into the case unbidden is admirable. Yet if her powers truly can locate the missing teen—perhaps saving her life, sparing searchers untold time, money, and effort, and bringing peace of mind to a grieving family— it seems unconscionable that Renier would refuse to do so simply because the Holloway family didn't specifically ask for her help.

In a startling admission, Renier acknowledged that psychic information often turns out to be wrong: "From past experience I know that different people's dreams or psychic impressions of where she is vary greatly. So, more often than not, the information they receive conflicts, making it difficult for the authorities to know which ones may be right." This is of course what skeptics have been saying for years, that information from psychics is contradictory and unreliable. Given that Renier has never directed police to missing persons, her reluctance to contribute to the Holloway case is understandable. (One of Renier's high-profile "successes" is Laci Peterson, despite the fact that Peterson's body was actually discovered accidentally by a passerby.)

Tragically, psychics also failed to locate three New Jersey children who disappeared on June 22. Daniel Agosto, six; Jesstin Pagan, five; and Anibal Cruz, eleven, were last seen playing outside their Camden home in the early evening. Dozens of searchers used helicopters, boats, bloodhounds, and scuba divers to search the neighborhood and the nearby Delaware River. Their bodies were found two days later in the trunk of a car near where the boys were last seen playing. Autopsies concluded that the boys suffocated after climbing into the trunk. Accurate psychic information might have rescued the children from a horrible death, yet not a single psychic came forward to direct searchers to the car trunk.

—Benjamin Radford

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This Fall's Flood of Paranormal Programming

It appears that no matter where you click with your remote control these days, the new fall television lineup is certain to have your skeptical blood boiling. Here are some recent newspaper headlines about the network and cable fare this fall:

> "Network TV grows spookier in bid for viewers"
> "Networks Bet on Appetite for Paranormal in TV Lineups"
> "New TV season will have many paranormal shows"
> "Psychics See a Future in Television Programs"

The articles go on to discuss the unprecedented number of new and returning television shows with paranormal themes, including psychic powers, aliens, mysterious monsters, and speaking to the dead.

The upcoming shows include: *Threshold* (about government preparations for an alien invasion); *Surface* (about deadly sea monsters); *Invasion* (alien invasions); *Night Stalker* (a revival of the 1970s series); *Supernatural* (about two brothers battling evil forces); and *Ghost Whisperer* (a CBS clone of *Medium*, loosely based on James Van Praagh's books) starring Jennifer Love Hewitt. (Hey, it's not *all* bad!)

There are, of course, the current and recent hits such as *Lost*, *Medium*, *Revelations*, *The 4400*, *Living with the Dead*, *Psychic Detectives* on NBC via Court TV, and the consistent pandering of such shows as *Larry King Live*. Then there's *Ghost Hunters* and *Dead Famous: Ghostly Encounters* (chasing after such "spirits" as Frank Sinatra, Marilyn Monroe, and Jim Morrison) and Court TV's *Haunting Evidence*. Even *Dateline NBC* got into the act with "The Mystery of Miracles," which aired on May 19, and conveniently led into the *Revelations* miniseries.

Maybe you're planning to turn off the cable and rent yourself a movie? Think again. Recent movies that deal with

Police Chief Misleads Viewers on *Psychic Detectives*

An episode of Court TV's *Psychic Detectives* series (aired May 11, 2005) titled "Dressed to Kill," recreated "psychic" John Monti's role in a 1988 murder case. Among those featured were two police chiefs involved in the search for the killer: James Basile (of Buckland, Massachusetts) and Steve LeTour (of Charlemont, Massachusetts). Basile summarized Monti's value in the case this way:

> My first impression was maybe, just maybe. . . . And then it became sort of like a wild goose chase. . . . We spent between four and five days with John Monti, and we pretty much covered a lot of places with him in that period of time. And towards the end it became very frustrating, and at that point we told John we no longer need his services, and we parted our ways.

In contrast, viewers saw Chief LeTour say this: "If we [Monti, Basile, and himself] would have kept going for probably 200 more yards, we would have ran [*sic*] into Mark Branch [the killer]." According to LeTour, the only reason they turned back just yards short of pay dirt was that "it was getting extremely icy, and I just felt that it was getting too dangerous." He later added, "[At first] I was very skeptical. But in hindsight, after the investigation was over, just unbelievable, it was just unbelievable."

Chief LeTour's endorsement led the show's narrator to conclude, "All along, John Monti's visions were leading them directly to the body of the killer." But this was hardly Chief Basile's "wild goose chase" scenario. When I wrote to the Charlemont Police Department for clarification, I received a return call from now-Chief Mark L. DeJackome, who was (and still is also) the chief in nearby Shelburne, and who was deeply involved in the 1988 case with Basile and LeTour. He told me:

> What Basile said on the show was extremely accurate. Monti sent us on more friggin' wild goose chases. One night he was going, "I can feel him! I can feel him! He was here! He was here!" But [Branch] turned out to be already dead, five miles away, hanging in a tree. . . . Monti said we would find him behind a white farmhouse with a dog. That describes half the houses in town.

As for Monti having led police to within yards of the killer's body, DeJackome said:

> That's not true. That's not true. I was involved in that whole search from start to finish, except on that particular day I didn't go out on that one search [during the sleet storm]—I probably was out on another call. But I just talked to Basile again about half an hour ago. It did get icy that night, but he said Monti never led them closer than about a mile and a half from where they ultimately found him [Branch].

The Court TV documentary was so inaccurate, according to DeJackome, that "While I was watching it, I was going, 'Are we talking about the same incident?'" When I asked him to speculate as to why LeTour would make such misleading comments on national television, DeJackome answered, "Well, maybe that's how he remembers it. I don't know. But when the show asked me if I wanted to participate, I said absolutely not. I didn't want anything to do with it. John Monti did not do anything [useful] to find this guy."

—Gary P. Posner

Gary P. Posner is the founder of Tampa Bay Skeptics and a CSICOP Scientific Consultant.

paranormal themes include *Constantine*, *Exorcist: The Beginning*, *The Amityville Horror*, *War of the Worlds*, *Suspect Zero*, *What the Bleep Do We Know?*, *White Noise*, *Incident at Loch Ness*, and *The Exorcism of Emily Rose*. A film currently in production, *The Reaper*, will star two-time Academy Award winner Hilary Swank as a professor who debunks miracles. To their credit, the producers purchased back issues of the SKEPTICAL INQUIRER to aid in their research, and they may be used as props in the movie. (We haven't seen the script, but our psychic powers tell us that by the end of the movie, Swank's character will probably come across something she cannot explain and renounce her skepticism.)

—*Barry Karr*

Barry Karr is Executive Director for the Committee for the Scientific Investigation of Claims of the Paranormal, publisher of SKEPTICAL INQUIRER.

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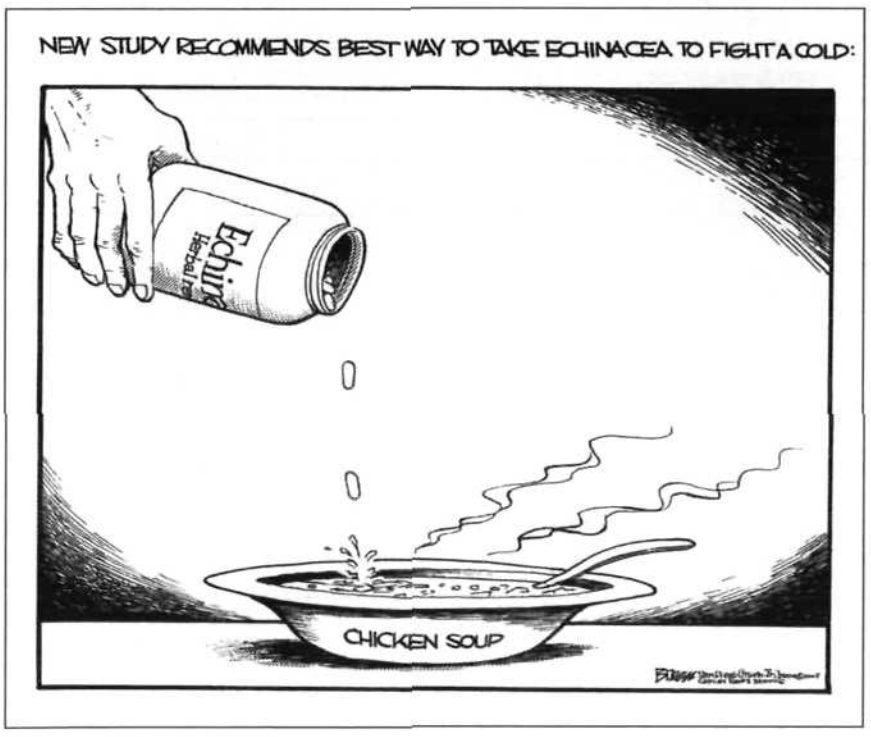
Recent News on Alternative Medicine

Echinacea found to be ineffective as a cold treatment: A federally funded study, conducted by Ronald Turner, M.D., et al., of the effectiveness of *Echinacea angustifolia* against rhinovirus infections, has shown that herbal remedy to be ineffective as a preventative or treatment for the common cold. A pool of 437 volunteers were randomly assigned to be either the control group or to receive treatment with one of the three prepared types of echinacea extract or a placebo. A randomly selected group of 399 of the volunteers were given rhinovirus type thirty nine and were observed in a sequestered setting for five days. The researchers concluded that any of the echinacea compounds, alone or in combination, had no clinically significant effect on the rate of infection or the severity of the symptoms of the rhinovirus or its resulting clinical illnesses. In other words, the belief that echinacea, or purple cone flower, can protect people from the common cold is unfounded. The best prevention is still to eat well, get plenty of sleep, wash your hands frequently, and keep your hands away from your face. The study ("An Evaluation of *Echinacea angustifolia* in Experimental Rhinovirus Infections" by Ronald B. Turner, M.D., et al.) was published in *The New England Journal of Medicine* on July 28, 2005.

Treatment with "raw" shark cartilage not valid in advanced cancer cases: A recent study of this popular alternative medicine was carried out by Charles L. Loprinzi and colleagues (published as "Evaluation of shark cartilage in patients with advanced cancer: A North Central Cancer Treatment Group trial" in the July 1, 2005 issue of *Cancer*). Eighty-nine patients with incurable breast or colon cancer were treated with shark cartilage, in powder form mixed with liquid, or a placebo, three times a day. Patients were instructed to continue with regular treatments of chemotherapy or other care. Patients were monitored over the course of five years. Researchers concluded that there was no overall difference in survival between the two groups and that there was no evidence that patients receiving the shark-cartilage treatment experienced a better quality of life or alleviation of symptoms. In fact, those taking shark cartilage experienced side effects, including diarrhea, low white-blood-cell count, bone pain, and difficulty breathing. Though some claim that sharks rarely develop cancer because of the high cartilage content of their bodies, ingesting shark cartilage suspended in liquid can make an already painful illness worse. The researchers did state, however, that a drug derived from shark cartilage may play a role in cancer therapy in the future.

Acupuncture may have an effect on male sterility: A study published in the July 2005 issue of *Fertility and Sterility*, the official journal of the American Society for Reproductive Medicine and other organizations ("Quantitative evaluation of spermatozoa ultrastructure after acupuncture treatment for idiopathic male infertility," conducted by Dr. Jian Pei et al.) made a quantitative evaluation of structural defects in spermatozoa after acupuncture treatment for idiopathic male infertility. Forty men with sperm abnormalities were collected to see if acupuncture therapy had any effect on the structure of their sperm. Twenty-eight of the subjects received acupuncture twice a week over a period of five weeks. They gave semen samples which were randomized with the samples from the twelve control-group members. A transmission electron microscopy (TEM) was used to evaluate the samples, and quantitative analysis was made using a mathematical formula based on submicroscopic characteristics. Statistical evaluation of the data showed a decrease in the structural defects of the sperm from the acupuncture recipients over that of the control group. However, the statistical data for specific pathologies, for example, immaturity, showed no statistically significant changes with acupuncture. Researchers concluded that acupuncture could be a beneficial treatment for general idiopathic male infertility,



Velikovsky Papers to Princeton University

The papers of Russian-born American author Immanuel Velikovsky have a new home in the Princeton University Library. His daughter, Ruth Sharon, of Princeton, has donated the papers for use by researchers, the university announced on July 29.

Velikovsky, who lived from 1895 to 1979, is best known as the author of a number of controversial books, primarily arguing that ancient myths, legends, and accounts of catastrophic events related in the Bible and other texts have a basis in fact. They include *Worlds in Collision* (1950), *Ages in Chaos* (1952), and *Earth in Upheaval* (1955). The furor over them, and over the slightly later works of best-selling pseudoscience authors such as Erich von Däniken, helped launch the modern skeptical movement.

"Decades of bitter debate resulted from his [Velikovsky's] controversial theories about cosmological catastrophes, particularly in regard to the planet Venus, and his interpretation of historical, geological, and paleontological evidence," said Don Skemer, the curator of manuscripts in the library's Department of Rare Books and Special Collections.

Harlow Shapley, Cecilia Payne-Gaposchkin, Carl Sagan, and other prominent American scientists were among Velikovsky's critics. The controversies over Velikovsky and the publication of his work have been the subject of several books, including that of CSICOP Fellow Donald Goldsmith (editor), *Scientists Confront Velikovsky* (1977).

Immanuel Velikovsky

Velikovsky earned his M.D. degree from the University of Moscow in 1921 and lived in the 1920s and 1930s with his family in Palestine, where he pursued a specialization in psychoanalysis and psychotherapy. He moved to the United States in 1939 and began his research on the history of Egypt, Greece, and the Jewish past. He lived first in New York City and later in Princeton.

The Immanuel Velikovsky Papers comprise 156 boxes of published and unpublished manuscripts and drafts, subject files, lectures, personal and professional correspondence, and legal documents dating from the 1920s to the 1990s.

The papers are available for research use in the library's manuscripts division in the Department of Rare Books and Special Collections.

—Kendrick Frazier

Kendrick Frazier is the editor of the SKEPTICAL INQUIRER.

however, no specific sperm pathologies that could be particularly sensitive to acupuncture therapy were identified.

Five-year-old Autistic Boy Dies Following Chelation Therapy: Abubakar Tariq Nadam, a five-year-old boy who suffered from autism, died in a Pennsylvania hospital after experiencing cardiac arrest in his doctor's office on August 23, 2005. The incident followed a treatment, the boy's third, with what is known as chelation therapy for his condition. Chelation therapy involves the intravenous injection of a synthetic amino acid (EDTA, or ethylene diamine tetraacetic acid) to trap and remove heavy metals from the bloodstream through urinary excretion. Some believe that autism may be brought on by concentrations of lead or mercury in the body's systems, making chelation therapy applicable to that disorder; opponents say that there is no real evidence of that source of causation. Further, those opponents argue that it is too risky for the recipients and can lead to kidney and heart damage. The Food and Drug Administration has approved chelation therapy for use only in cases of acute heavy-metal poisoning.

An autopsy will be required to reveal the exact cause of a heart attack in a boy that age, and the Pennsylvania state police are investigating the matter. The treatment was being administered by Roy E. Kern, M.D., at the Advanced Integrative Medical Center in Portersville, Pennsylvania. The doctor's specialization is listed as otolaryngology with focus on allergy and immunology. Howard Carpenter, the executive director of the Advisory Board on Autism-related Disorders, is quoted in an Associated Press report as saying that "it was only a matter of time before the use of chelation therapy resulted in the death of someone under treatment."

—Kim Stewart and David Park Musella

Kim Stewart is an intern with the Center for Inquiry–Transnational.

Top 25 Science Questions: A Stimulating List of What We Don't Know

Science thrives on seeking solutions to unanswered questions. In recognition of that fact, *Science* magazine, observing its 125th anniversary, published a special issue, "What Don't We Know?" (July 1, 2005). The editors selected 125 questions that point to gaps in our basic scientific knowledge. They then chose twenty-five to highlight.

"The choice reflects our belief that questions are more important than answers in shaping the future of science," wrote *Science* editor in chief Donald Kennedy in an editorial. "Research is about answers, but science is about questions."

One limiting ground rule was that scientists should have a good shot at answering the questions over the next twenty-five years, or at least know how to go about answering them.

It's not a survey of society's challenges nor a forecast of what science might achieve, the editors noted. "Think of it instead as a survey of our scientific ignorance, a broad swatch of questions that scientists themselves are asking," wrote Kennedy and news editor Colin Norman in their introduction.

Science journalist Tom Siegfried, in the section's opening essay, explained that "Science's greatest advances occur on the frontiers, at the interface between ignorance and knowledge, where the most profound questions are posed."

A special forum was posted on *Science*'s Web site to comment on the topic (www.sciencemag.org/sciext/eletters/125th).

—*Kendrick Frazier*

Here are the twenty-five questions chosen:

- What is the universe made of?
- What is the biological basis of consciousness?
- Why do humans have so few genes?
- To what extent are genetic variation and personal health linked?
- Can the laws of physics be unified?
- How much can human life span be extended?
- What controls organ regeneration?
- How can a skin cell become a nerve cell?
- How does a single somatic cell become a whole plant?
- How does Earth's interior work?
- Are we alone in the universe?
- How and where did life on Earth arise?
- What determines species diversity?
- What genetic changes made us uniquely human?
- How are memories stored and retrieved?
- How did cooperative behavior evolve?
- How will big pictures emerge from a sea of biological data?
- How far can we push chemical self-assembly?
- What are the limits of conventional computing?
- Can we selectively shut off immune responses?
- Do deeper principles underlie quantum uncertainty and nonlocality?
- Is an effective HIV vaccine feasible?
- How hot will the greenhouse world be?
- What can replace cheap oil—and when?
- Will Malthus continue to be wrong?

Philip J. Klass
(1919–2005)

By Robert Sheaffer

The man who was indisputably the most influential UFO skeptic of all time passed away in Merritt Island, Florida, on August 9 at the age of 85. Philip J. Klass was the man that UFO proponents loved to revile from the time he first became active in UFO investigations in the late 1960s, until failing health forced him to retire from UFOlogy in 2003. To the extent that UFOlogy is a religion, Klass fit perfectly into the role of its Satan, precisely because he was so effective in casting doubt on UFOlogy's most high-profile, cherished cases.

Philip Julian Klass was born in Des Moines, Iowa, on November 8, 1919, and grew up in Cedar Rapids. His father was a lawyer, which undoubtedly influenced his style of argument. Klass would often argue about a UFO case like a lawyer in front of a jury, sometimes using circumstantial evidence to cast doubt on a dubious UFO claim when there was no "smoking-gun" evidence against it. For example, if Father Gill and his Papua New Guinea congregation truly believed a UFO was approaching, signaling them, and about to land, why did they go inside to eat dinner? While many found such arguments persuasive, the dedicated UFO believers usually found Phil infuriating.

Philip J. Klass. Photo by Tom Flynn

Klass attended Iowa State University, graduating in 1941 with a degree in electrical engineering. After graduation, he moved to Schenectady, New York, to take a job with General Electric. His work on defense-related electronic systems earned him a draft deferment during World War II. Afterwards, his expertise in avionics—aviation-related electronics systems—gained him professional recognition, culminating in an offer from the industry-leading *Aviation Week & Space Technology* magazine in 1952 to join its editorial staff in Washington, D.C. Klass accepted the offer, becoming the senior avionics editor. Over the following forty years, he gained a worldwide reputation in the aerospace industry for his writing. He was named a fellow of the Institute for Electrical and Electronic Engineers in 1973 for his work in technical journalism and earned numerous other awards.

Klass's first involvement with UFOs came from a pair of articles he wrote for *Aviation Week* in 1966, later expanded into his first book, *UFOs Identified* (in 1968). After reading John G. Fuller's pro-UFO book *Incident at Exeter*, Phil thought that the objects could be "identified" as plasma balls, similar to ball lightning, hovering near power lines. He was convinced that the "classic" Lucci brothers photos, included in Fuller's book, were a plasma phenomenon. I first met Phil in 1968, but not until 1970 did we have the opportunity to discuss this case at length. I tried to persuade him that the "plasma" explanation for the UFO phenomenon was at best quite speculative and that the Lucci photos were likely hoaxes, as suggested in the then-newly released Condon Report (and since confessed by one of the hoaxers). Because I had been able to duplicate the photos quite convincingly, Phil came to agree, gradually leaving the "plasma UFO hypothesis" all but discarded. But even this first book hints at the depths of Phil's knowledge and interests: his firsthand investigation convinced him that the Socorro landing was

Robert Sheaffer is a leading skeptical investigator of UFOs, a longtime CSICOP Fellow, and a founding member of the CSICOP UFO Subcommittee. He worked closely with Klass on many UFO-related matters for over thirty years. He was also a founding director and past chairman of the Bay Area Skeptics, a local skeptics' group in the San Francisco Bay area. Mr. Sheaffer lives near San Diego, California. He is the author of UFO Sightings *(Prometheus, 1998). His Web site is at www.debunker.com.*

a hoax, and he explains the Betty and Barney Hill "UFO abduction" as a complex psychological event.

As early as 1968, Phil began to wonder how many UFO proponents truly believed their own propaganda about "proof" of alien saucers and challenged them to "put their money where their mouths are." He proposed a $10,000 agreement: Klass would pay the signer $10,000 upon definite proof of an alien landing, as affirmed by the National Academy of Sciences, or an actual appearance of an alien being on a TV news program. The signer, however, must pay Klass $250 a year, for up to twenty years, for each year that this *did not* happen, while Klass would remain obligated by the agreement for the rest of his life. (These forty-to-one annual odds against a "UFO revelation" are actually quite generous for those who go around proclaiming that the government is about to release dramatic UFO secrets any day now.) He actually did collect some payments from a few individuals, including Stanton Friedman, but nobody stayed current with the agreement very long. Phil had made his point: even the most ardent talkers about "government coverups" and "impending disclosures" do not *really* believe their own babble.

In 1974 came Phil's second UFO book, *UFOs Explained*, to my mind still his best. It took down such highly publicized cases as the RB-47 aircraft-radar UFO case, the army-helicopter case in Mansfield, Ohio, the "abduction" of two fishermen in Pascagoula, Mississippi, and an alleged "landing-trace case" in Delphos, Kansas. All of these were being widely touted by prominent UFO believers, including the former U.S. Air Force Project Bluebook consultant, Dr. J. Allen Hynek, as solid evidence. Nobody except Phil could have convincingly tackled UFO cases involving radar, aircraft instrumentation, etc. His knowledge of avionics was second to none, and when a radar system or an aircraft control behaved strangely, causing some to attribute the anomaly to distant lights in the sky, Phil would go straight to the technical manual for the relevant avionics, and explain exactly what had happened.

In 1976, Klass participated in the meetings that resulted in the founding of CSICOP, and became one of its most active and energetic Fellows. For many years, he served on its Executive Council.

ers. Because the amount of labor involved in sending out skeptical information and "white papers" to an ever-increasing number of UFO skeptics steadily grew, Klass began publishing a *Skeptics UFO Newsletter* (*SUN*) in December 1989, published six times a

"If I ever found out that there was anything to the claims about a secret government UFO project, I'd write it up for *Aviation Week*."

More UFO books were to follow: *UFOs: The Public Deceived* in 1983, *UFO Abductions: A Dangerous Game* in 1988, and *The Real Roswell Crashed-Saucer Coverup* in 1997. Phil also wrote a book for young readers, *Bringing UFOs Down to Earth* in 1997.

Klass was anything but an "armchair" investigator. He traveled to Socorro, to Roswell, to Delphos, and many other places—always at his own expense—to investigate major UFO cases. When he was not traveling, he was on the telephone with witnesses, with other UFO investigators, or with law-enforcement personnel. Between the books, he somehow managed to write an amazing quantity of material pertaining to cases he was investigating, frequent challenges to the "other side" to answer difficult questions and "white papers" that set forth his position on a controversy, usually also containing pointed criticisms of positions taken by the opposition. I accumulated entire notebooks filled with such papers that were being sent back and forth.

In 1980, Phil was instrumental in bringing together a UFO subcommittee of other active skeptics, eventually including James Oberg, Gary Posner, James McGaha, and myself, among oth-

year. The effort required to keep writing and publishing so much high-quality material, in addition to his regular full-time career, must have been prodigious. Publication of *SUN* continued until the end of 2002 (readers can access back issues online at www.csicop.org/klass files/home.html).

Klass was very much a "Washington insider." He knew cabinet secretaries and congressmen, and he occasionally met presidents. The magazine where he worked was widely and affectionately known as "Aviation Leak," for its many revelations about new military projects under development. He would often say something like, "If I ever found out that there was anything to the claims about a secret government UFO project, I'd write it up for *Aviation Week*." Indeed, the total lack of credible insider rumors and leaks on the subject was one of the reasons Klass remained so completely skeptical about UFOs. He and his colleagues got plenty of insider leaks about stealth aircraft, ABM systems, spy satellites, and the like—but *nothing* about UFOs. During the Cold War, on more than one occasion, Russian "businessmen" in Washington (no doubt working in a more official capacity) offered hospitality to Phil, hoping to glean some nuggets of

insider knowledge. Phil always kept the FBI informed of such approaches.

A man who always placed work before relaxation, Klass typically spent at least eighty hours per week on the combination of his *Aviation Week* career, his UFO investigations and writing, and later, on his condominium association. (He felt he was protecting his investment by playing as large a role as possible in the management of common expenses and repairs.) Klass officially retired from *Aviation Week* in 1986, but his workload since then seems if anything to have increased. He kept writing avionics articles, saying that the only difference his retirement made was that he was now doing most of his work at home. The truth is that Klass simply could not sit idle; when time opened up, he had to reach out to take on more work.

He used his scant free time in active pursuits, especially skiing and sailing. I had the privilege to accompany Phil on several sailing adventures on the Potomac River, where it was obvious he enjoyed the boat's pitching and swaying far more than did I. He continued his active life until he was approaching eighty. For many years, he lived in an impressive bachelor apartment in Washington's exclusive Harbor Square apartments, overlooking the Potomac and the Washington Monument. Many out-of-town visitors, including both pro- and anti-UFO researchers, enjoyed his hospitality. Always atypical, the longtime bachelor married for the first time at age sixty to Nadya Ganev, a Bulgarian-born woman who was working as a broadcaster for the Voice of America, and who now survives him.

One unmistakable "Klassic" trait was his fearlessness. Phil always followed a line of argument to its conclusion and argued all of it forcefully, no matter who might disagree or be offended. During the "missile gap" debates of the 1960s, Klass, using a pseudonym, wrote a series of reasoned articles in an influential publication arguing against a hasty missile buildup, articles that might have ended his career as an aerospace journalist had his identity leaked out. And when confronting UFO promoters, Phil was unstoppable. He delighted in the role he called "skunk at the garden party" at pro-UFO conferences that he frequently attended, naturally at his own expense. On the downside, Phil's argumentativeness was not always directed at proper targets. He could be an extremely difficult man to work with, and his tendency to escalate small disagreements into major arguments needlessly alienated more than a few of his fellow skeptics.

Toward the end of his career, even many of UFOlogy's most dedicated proponents grudgingly expressed a degree of admiration for Klass and for his role in trimming away misinformation and imposture. UFO promoters typically claim that skeptics are "uninformed" about the supposedly excellent "evidence" for UFOs, but everybody agreed it was impossible to say that about Klass. Phil may be gone, but thanks to James McGaha, Asteroid 7277, a ten-kilometer piece of rock, was officially named "Klass" in his honor, and it will circle the sun for as long as the solar system survives.

Robert A. Baker

(1921–2005)

By Joe Nickell

Robert A. Baker—one of the world's preeminent authorities on such phenomena as ghosts, alien abductions, religious apparitions, and reincarnation—died August 8 at his home in Lexington, Kentucky, at age 84. He is survived by his wife Dolly and six children.

Dr. Baker—Bob to his many friends—worked at the MIT Lincoln Lab (1950–1952), conducted training research for the U.S. Army (1953–1968), and taught at the University of Kentucky (1969–1988), chairing the psychology department there until his retirement.

The author of more than a hundred professional journal articles, he also wrote fifteen books, including *They Call It Hypnosis* (1990), *Hidden Memories: Voices and Visions from Within* (1992), *Mind Games* (1996), *Child Sexual Abuse and False Memory Syndrome* (1998), and (with Joe Nickell) *Missing Pieces: How to Investigate Ghosts, UFOs, Psychics & Other Mysteries* (1992). He was a frequent contributor to SKEPTICAL INQUIRER and was a Fellow of CSICOP as well as the American Psychological Association.

Joe Nickell is CSICOP's Senior Research Fellow and author of numerous investigative books—most recently Secrets of the Sideshows *(University Press of Kentucky, 2005).*

A warm and witty man, he wrote of his formative years (in an essay in Paul Kurtz's *Skeptical Odysseys*, 2001):

> Like other members of the human race I exist because of a set of concatenated and fortuitous natural circumstances over which I had no control. If one considers this fortunate I was also lucky in numerous other ways. First, though uneducated (no one in my great-grandparents' families was literate) my parents were both bright and liberal. They were also poor and were kind enough not to saddle me with any political, social, religious, or economic baggage. They encouraged me to read, think, and get an education. They also, inadvertently, started me on the skeptical path by taking me at an early age to the local First Baptist Church where the new minister—one Percy Walker—a kind, gentle, soft-spoken man turned into a fiery-faced, screaming maniac every time he took to the pulpit. My parents and I would gape in awe at this amazing personality transformation. When I asked my father what was wrong with the reverend, he smiled and said, "Religion makes some people crazy."

Bob came to conclude that most of the thinkers and "psychological luminaries" of his day were offering little of value regarding mankind's important problems, the scene being dominated by "antiscientific Freudian beliefs and radical behaviorist exaggerations." He was so disillusioned that he almost abandoned his chosen career until he discovered the new "humanistic" psychology of Abe Maslow. Later, while still a research scientist for the Human Resources Research Office of Fort Knox, he was inspired by Paul Kurtz's *Decision and the Condition of Man* (1968).

Subsequently, his interest in humanistic and anomalistic psychology would never waver. He launched a ten-year research program that examined hypnosis and its impact on memory, eyewitness testimony, and the accuracy of recall, as well as investigating such applications as so-called past-life regression. He concluded that hypnosis was merely relaxation, suggestion, and the impetus to imagine, even to fantasize.

He was also an inveterate ghostbuster. While I was completing doctoral work at the University of Kentucky, he and I teamed up to investigate a number of paranormal cases, and in 1992, we published our investigative manual, *Missing Pieces.*

"There are no haunted places, only haunted people."

Robert A. Baker.

Bob was fond of saying, "There are no haunted places, only haunted people." A true inquirer, he believed paranormal claims should neither be accepted uncritically nor dismissed out of hand, but rather that they should be carefully investigated with a view toward solving them.

One of his favorite early cases involved a young married couple living in a small town close to Fort Knox. The wife was being haunted by the spirit of a beautiful little girl. Investigating, Bob discovered that no one else ever saw or heard the spirit. Further, he learned that the couple wanted desperately to have children but had not been successful. He counseled them to consider adopting a child, and when they did, the little ghost girl went away forever.

That case illustrates the two qualities I admired most in my best friend: wisdom and humanity. He again displayed both when he wrote (in *Skeptical Odysseys*):

> Emotional traumas in childhood, i.e., mistreatment or lack of love, can warp, shape, and twist our personalities, outlooks, attitudes, and behavior for the remainder of our lives. Emotional wounds within families, i.e., conflict between mothers and fathers and their offspring and relatives, can spawn hate, violence, and tragedies beyond rational comprehension. There is great truth in the statement: God *Is* Love. And this is a human not a religious contention. Emotion lies behind and motivates all art, music, literature, dance, the theater, painting, and sculpture, and science as well. Though scientists pride themselves on their pure unemotional powers of intellect uncontaminated by base emotion, they fail to realize that their very intellect is itself driven by affect and feeling. Without an emotional core they would be little more than programmed automatons or robots. To be without affect is to be inhuman.

That is probably as close to a sermon as the celebrated secular humanist ever got. Amen, Bob; farewell wise, human friend. □

Skeptics and TV News Expose 'Magnetic Water Conditioners'

DAVE THOMAS

The afternoon of Thursday, June 23, was splendidly sunny in Albuquerque, and I was leaving the office to drive over to the home of longtime New Mexicans for Science and Reason (NMSR) members Jerry and Nancy Shelton. My cell phone went off, and I saw it was Larry Brown of R and L Enterprises, Inc., a distributor for GMX, a firm that sells magnets for conditioning household water supplies. Brown was calling to confirm meeting me at the Sheltons for the GMX "Free Walkthrough" at 2 P.M. Brown usually leaves his Alamosa, Colorado, base for swings through Albuquerque on Thursdays and Fridays of most weeks, and we had arranged the presentation a few days earlier.

When Brown hung up, I quickly called the Sheltons' house. "Is the Channel 13 guy there yet?" I asked. Hearing that he was, I asked if the hidden camera was already set up. It was. "We are go! See you in twenty minutes!" I said.

It had all begun a month earlier, when Larry Barker, the veteran investigative reporter for KRQE TV 13, the local CBS affiliate in Albuquerque, called me to discuss GMX and their magnets. He had seen their ads in local publications, and was wondering if simple magnets would provide the remarkable benefits GMX said they would. Barker suggested I call the company for their informational package, which I did. When it arrived, I read how GMX magnets don't really alter the chemistry of water, but do affect surface tension in the water, and thus control crystallization of minerals in treated water. It was all possible because of the wonderful science of "magnetohydrodynamics," I read. There were numerous testimonials, and lots of scientific support developed by a Dr. Klaus Kronenberg. GMX magnets were said to break down existing scale in domestic water systems over a period of a few months. However, they were said to prevent formation of new scale in systems as soon as they were installed.

Larry Brown arrived on schedule, and we began taping undercover video. I had asked Barker about this earlier, asking "Don't we have to tell him we are taping?" Larry Barker explained that we were simply asking Brown to do his normal spiel, the same things he says to customers every week. It wasn't like we were trying to trick him into murdering his wife or selling drugs—we were giving him an opportunity to present his product in the same way he shows it to all of his customers. From the beginning of the project, Barker had asked, "Now, if this stuff really works, your experiments would be able to show that, right?" We all had agreed to take the subject seriously, and give it a fair test.

NMSR physicist Kim Johnson examining scale under the microscope.

Brown went through his product line with us. Treatment of a house with one water heater ran from $600 (three magnetic units) to $800 (four units). Pool treatment went from $400 to $800. Evaporative coolers were the least expensive, at $125 per unit (Model 400). Brown's flyer said "One Model 400 will keep the mineral deposits from clogging the cooling pads. The cooler, pads, and pump will last longer and it will cool more efficiently." "Aunt Nancy" said she liked the potential, but wanted to just try the air-conditioner model for the summer to see if she liked it. Brown, Nancy's friend Glen (actually a news producer for KRQE), and I went up to the roof, where I saw how to install the Model 400 on the swamp cooler's water supply tube, about a foot or so from where the

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tube leaves the pump. Glen got the entire walkthrough on tape. Brown also talked for several minutes about the magnet's use in improving gas mileage and lowering emissions. Nancy wrote a $125 check to GMX, and Brown zipped off to see his next customer.

The next day, Jerry retrieved the magnet from his roof and brought it over to me. Barker had asked NMSR to figure out how to test Brown's claims, and we'd talked it over for a few days. NMSR physicist Kim Johnson suggested we build two mock swamp coolers, and run them for as long as we could. That interval was about three weeks, because of the need to wrap the story up by the end of summer sweeps. I obtained two sets of mock-cooler supplies at the local hardware store, and Kim Johnson soon had two identical mini-swamp coolers running.

Each had a standard pump, a water tube, a section of cooler pad to receive the water, glass slides to form crystals as water dripped on them, fans to stimulate evaporation, and so forth. The two mock coolers were as identical as possible, and were made entirely with pristine materials. The only difference was that one cooler had the model 400 GMX installed right where it was supposed to be in order to "keep the mineral deposits from clogging the cooling pads." Since the magnets were supposed to prevent formation of new scale immediately, we would have a clear indication at the end of the test.

The experiment was started on July 1 and ran until July 20. We met Barker to review the results, and film interviews, on July 21. First, we looked at accumulation of scale on the sections of cooler-pad material. These sections had been weighed beforehand, and were carefully weighed again. There was significant scale buildup on both pads—you could easily see colored streaks of mineral deposits. The glass slides showed accumulation of crystals similar in volume and in microscopic appearance. We compared magnetically treated calcite crystals to normal crystals at high magnification, because GMX said there would be a very clear difference. There was none, however.

We also carried out a suds test, which was described in the GMX literature. We put a drop of soap into test tubes containing treated and untreated water, and shook them. GMX had said "The foam on top of the untreated water disappears after an hour. The foam on top of the treated water will hardly diminish." However, no differences between the two tubes could be seen.

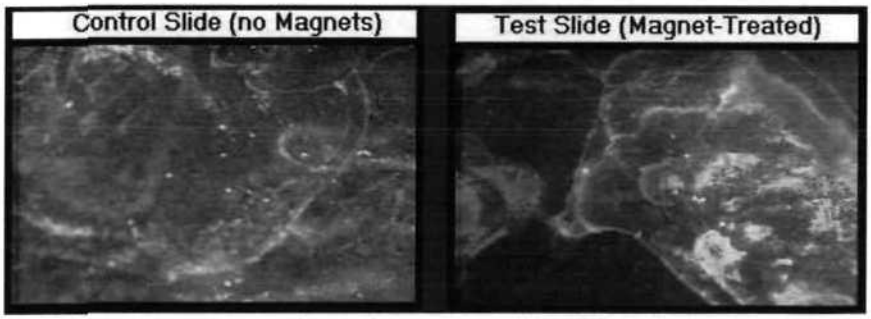
The segment showing all this was aired on KRQE TV 13 on July 27. Barker explained the basic pitch, the undercover video, and the experimental setup. He then asked Kim Johnson if there had been any differences between magnetically treated and normal systems: there was none. I said on air, "It's clearly pseudoscience. It has the trappings of science, but when you dig into it, there's nothing there. There's no evidence, there's no proof, there's no logic, there's not even a *why* it works."

Larry Brown agreed to be interviewed, and he tried his best to answer Barker's difficult questions. Barker asked him if seeing evidence that his systems didn't work would ever change his mind about them, and Brown answered that it would not—that he'd heard from too many satisfied customers to ever doubt the magnets' utility.

Barker asked him if seeing evidence that his systems didn't work would ever change his mind about them, and **Brown answered** that it would not—that he'd heard from too many satisfied customers to ever doubt the magnets' utility.

All in all, it was an excellent segment. We've worked with Barker before, on topics like Roswell and free electricity, and hope to work with him again in the future. This wasn't even Nancy Shelton's first experience wearing a wire—that came in an investigation of state-fair psychics a few years ago.

Those with high-speed computer connections to the Internet can watch the entire segment online at the KRQE Web site, at www.krqe.com/LarryBarker/. It's titled "Scientists dispel claims of 'wetter' water device." The caption reads: "It claims to give you 'wetter' water, and even improve the gas mileage on your car. Larry Barker had scientists put it to the test." □



Results show that magnet-treated water shows calcium buildup similar to the untreated water.

Developing Perspectives on Anomalous Experiences

JULIA SANTOMAURO

As readers of the SKEPTICAL INQUIRER are aware, anomalous experiences are commonly reported, not only in modern Western society but throughout all known societies, both geographically and historically. Such experiences are often interpreted as evidence that paranormal forces really do exist. Parapsychologists are mainly concerned with attempting to produce convincing evidence for the existence of such forces, but most also acknowledge that not everything which appears to be paranormal really is. Complementing this approach is the one taken by most anomalistic psychologists. They are mainly concerned with trying to explain ostensibly paranormal events and experiences in non-paranormal terms. While acknowledging the theoretical possibility that there just might be forces operating in the universe which do not fit in with the conventional scientific worldview, they concentrate on producing and testing explanations of anomalous experiences based upon non-paranormal, especially psychological, factors.

The conference on Developing Perspectives on Anomalous Experiences. . . . brought together academics at the forefront of the fields of parapsychology and anomalistic psychology.

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The conference on Developing *Perspectives on Anomalous Experiences*, held in the United Kingdom at Liverpool Hope University College on June 4, 2005, brought together academics at the forefront of the fields of parapsychology and anomalistic psychology. An audience of around eighty was presented with speakers covering a wide range of topics from an equally wide range of perspectives. At the skeptical end of the continuum, Richard Wiseman started the day off by presenting an entertaining summary of his previous research investigating the unreliability of eyewitness testimony. He described the results of a series of studies in which the phenomena reported during Victorian séances were reproduced using the same fraudulent techniques employed by fake mediums at the time. The experiments showed that people's memories for important aspects of the sessions were often distorted and, in particular, that verbal suggestion could be a powerful factor in producing such distortion. Believers appear to be more prone to such memory distortions than nonbelievers, but only when the suggestion is in line with an outcome requiring a paranormal explanation.

Another presentation likely to have been of particular interest to readers of *SI* was given by Chris French. French and his colleagues (Julia Santomauro, Victoria Hamilton, Rachel Fox, and Michael Thalbourne) have recently completed collecting data comparing a group of nineteen "experiencers" (i.e., individuals who claim to have had contact with extraterrestrials) with a control group on a number of psychological and parapsychological measures. Experiencers were found to score significantly higher than the control group on a number of relevant psychological measures including dissociativity, absorption, tendency to hallucinate, fantasy

proneness, and incidence of sleep paralysis. This pattern is consistent with the idea that experiencers have a markedly different psychological profile than non-experiencers and, in particular, they have a profile that may indicate greater susceptibility to false memories. However, the current project was unable to replicate the finding reported by Susan Clancy, Richard McNally, and other colleagues at Harvard University, that experiencers were more prone to false memories on a word-list task. Experiencers were found to score much higher than controls on measures of paranormal belief and experience, and self-reported psychic ability, than controls. However, no differences were found between the groups in terms of performance on simple computerised ESP tasks.

Many of the other presenters were careful to address non-paranormal explanations of ostensibly paranormal experiences while remaining open to the possibility that genuine paranormal phenomena may occur. For example, Ciaran O'Keeffe and Matthew Smith presented an overview of potential environmental, psychological, and parapsychological factors that might underlie reporting of anomalous experiences typically associated with hauntings (such as sensing a presence, anomalous sounds, and temperature changes). They concluded that, although there was a need for further research, many of the experiences typically reported could be explained in terms of a combination of environmental and psychological factors. Simon Sherwood drew a similar conclusion at the end of his overview of reports of apparitions of black dogs.

Some of the speakers' presentations were entirely neutral with respect to the issue of whether psi exists. For example, Jezz Fox argued that science is incapable of proving the issue either way, and Robin Woffitt's research concentrates solely on the use of language when people are reporting ostensibly paranormal experiences. Etzel Cardeña discussed anomalous experiences during deep hypnosis and Craig Murray described some interesting studies of the body images of out-of-body experiencers.

Other speakers presented talks which appeared to be based upon the notion that psi probably does exist, but that a major challenge facing parapsychologists is to identify the best conditions under which it can be reliably demonstrated. Chris Roe argued that a greater focus on psi operating during altered states of consciousness might yield results. Christine Simmonds argued that parapsychologists should concentrate on identifying particular personality types (especially those with "thin" psychological boundaries) in order to improve their success. Caroline Watt suggested that experimenter effects should be more fully investigated. It is widely accepted within parapsychology that certain experimenters have the golden touch when it comes to producing positive results, but others (often skeptics) almost always fail to produce results supporting psi. Deborah Delanoy argued that more positive results might be forthcoming if parapsychological experiments were made more ecologically valid. Although the wider scientific community is only likely to be convinced that psi exists on the basis of reliable positive results produced under well-controlled conditions, it is undeniable that such conditions are very different from the real-life conditions under which ostensibly paranormal experiences are typically reported. Can a compromise be reached whereby positive results could be produced under more natural conditions, but with still enough control to provide useful evidence? All the presentations implicitly acknowledged that the evidence produced by parapsychologists to date is not strong enough to persuade the wider scientific community. Only Daryl Bem, the internationally respected professor of social psychology from Cornell University, argued, in reviewing his own work on precognitive emotional arousal, that the evidence in favor of psi was already very strong.

All the **presentations** implicitly acknowledged that the evidence produced by **parapsychologists** to date is **not strong** enough to **persuade** the wider scientific community.

Although this was an interesting conference with many excellent presentations, in the unlikely event that there were any truly neutral observers sitting in the audience, they could be forgiven for being somewhat confused by the mixed messages provided by the wide range of perspectives. At one extreme were the anomalistic psychologists, strongly implying that psi is probably not real. Then came the vast majority of the parapsychologists, acknowledging that the evidence is far from convincing but sure that psi could be demonstrated if only the correct conditions could be identified. And one or two voices claiming that the evidence was already strong. For all that, the conference certainly provided food for thought. □

Legends of Castles and Keeps

During the Middle Ages, the castle (from the Latin *castellum*, "small fortification") arose as the private fortress of a monarch or nobleman. Its central tower (like the Tower of London) is a *keep*, a term also applied to a fort or other stronghold, even a jail.

Castles offer a romantic, often gothic allure. If they're not haunted, I like to say, they ought to be! And not only are they supposedly inhabited by specters, but they are usually the focus of other legends as well.

I have explored and written about many castles and keeps—including Burg Frankenstein and Plassenburg castle in Germany (Nickell 2003a; 2003b), the Kremlin fortress in Moscow (Nickell 2002), the Old Melbourne Gaol in Australia (Nickell 2001), and others. Here are some additional ones I have investigated over the years and report on here for the first time.

Blarney Castle

The well-known term *blarney* refers to the gift of eloquence, attributed especially to the Irish. It is variously defined as cajoling, flattering talk; smooth, deceitful speech; or even nonsense. Legendarily, kissing the Blarney Stone is supposed to endow one with the powers of eloquence and persuasion.

Figure 1. Sketch of Blarney Castle from author's travel journal of 1971.

Reportedly, Queen Elizabeth I (1533–1603) coined the term *blarney* during the lengthy, tiresome negotiations concerning control of the fortress. The titular owner, Cormac McCarthy, Earl of Blarney, dutifully following the protocols of sixteenth-century diplomatic prose, wrote grandiose letters that praised the queen, without, however, relinquishing the land. Her regal feathers ruffled, Elizabeth was said to have huffed, "This is all blarney—he never says what he means!" (O'Dwyer 2000, 222).

The stone is located in the castle at Blarney, in County Cork, Ireland. Built in 1446, it is among the largest Irish tower castles. (See figure 1.) A spiral stone stairway leads up to three levels. (Originally, the first tier consisted of the kitchen and armory, the next the dining hall, and the third the chapel.) A smaller stair leads to the battlements and the Blarney Stone.

The stone is actually one of the great lintels in the parapet, and is reached by dangling upside down in the gap between the parapet and the wall (as shown in a photo in Constable and Farrington 2004, 94). Even though there are parallel iron bars at the bottom of the small shaft that would potentially keep one from plummeting to one's death, and a pair of vertical iron rails to hold onto, and even with a firm grip from the "Keeper of the Stone," the experience can be somewhat frightening. This is especially the case for one with acrophobia (fear of heights); as for me, I don't even like being this tall! I survived the experience in 1971, but instead of getting "the gift of gab" I was left speechless! (Of course, since I am of Irish ancestry, that was very brief.)

One legend about the castle is intriguing, and may stem from the fact that a limestone cave and dank dungeons are located near the castle (O'Dwyer 2000, 223; Nickell 1971). In 1651, after Oliver Cromwell's forces had conquered castle after castle—Limerick, for example,

Joe Nickell is the author of numerous books, including Inquest on the Shroud of Turin *and* Looking for a Miracle. *He is presently at work on* Relics of the Christ.

falling to siege tactics—Blarney claimed a sort of "moral victory" over the rebels. Allegedly, the castle's entire garrison secretly escaped through a tunnel beneath the massive tower—at least "according to Irish folklore" (Constable and Farrington 2004, 118).

The similarity of the word *blarney* to the American *baloney* (or *boloney*), meaning "nonsense," cannot go unnoted—especially since the latter is a popular skeptics' epithet. (For example, Carl Sagan, in his 1995 *The Demon-Haunted World: Science as a Candle in the Dark*, included a chapter titled, "The Fine Art of Baloney Detection.") Attempts to explain *baloney* as deriving from *bologna sausage* (e.g., Barnhart 1988, 73) are unconvincing. Some sources note that that connection is conjectural or frankly admit that the etymology is unknown (*Webster's* 1986, 34), while others offer different theories—for instance, that it may come from the Spanish *pelone*, meaning "balls" (Hendrickson 1997, 87).

I have long suspected *baloney* might actually be a corruption of *blarney* itself. Frequently foreign or other unfamiliar expressions are corrupted to a familiar one. For example, "Pennsylvania Dutch" is a corruption of Pennsylvania *Deutch* (i.e., German immigrants).

I finally discovered one scholarly source that acknowledged *baloney* was "possibly influenced" by *blarney* (Lighter 1994, 82). In any case, a fine distinction between the two words was expressed by Fulton John Sheen in 1938: "Baloney is flattery so thick it cannot be true, and blarney is flattery so thin we like it" (Bartlett 1955, 973).

Rock of Cashel

Another Irish castle represents an impressive sight: in county Tipperary, atop a gigantic limestone outcropping that rises abruptly to a height of 358 feet, stands a stone fortress wall enclosing the ruins of great medieval structures, including the Irish-Romanesque Cormac's Chapel (consecrated 1134), a thirteenth-century gothic cathedral, and a ninety-foot round tower. The latter, built shortly after 1101, remains the oldest part of "one of the most interesting assemblages of ruins in Ireland" (*Encyclopædia Britannica*, 11th ed. [1910], s.v. "Cashel"). It is known as the Rock of Cashel but is also called St. Patrick's Rock.

Legends about the castle range from the fanciful to the historical. The former is typified by a tale claiming that the rock was hurled by the Devil when he spied a church being built at Cashel. Fortunately the evil one had bad aim, and the Christians were undaunted (O'Dwyer 2000, 179).

On much more likely grounds, it appears that St. Patrick—the Briton who legendarily endured danger and hardship to convert Ireland to Christianity—did baptize King Aenghus of Munster at Cashel about A.D. 450, thus establishing Cashel as a bishopric.

Patrick himself is largely a legendary figure. While pious tales have him single-handedly Christianizing Ireland, the fact is that "this work took many more years than these legends allow" (Jones 1994, 189).

The most famous legends of St. Patrick have him using the shamrock to explain the doctrine of the Trinity and expelling snakes from the isle; hence these became his emblems (Jones 1994, 189). However, although snakes are indeed absent from Ireland, that fact is not due to saintly magic since there were never any snakes to expel. Instead, their absence results from the same factors that have also excluded other reptiles (except the newt) as well as such common English mammals as the mole, the weasel, and two varieties of mice. The absences are due to climactic conditions and Ireland's having become separated by the Irish Sea from the other British Isles before they were separated from Europe (*Encyclopædia Britannica*, 15th ed., Macropedia, s.v. "Ireland").

Not surprisingly, some say St. Patrick's Rock is haunted. I saw no ghosts when I visited many years ago, but I can understand how folk have fancied "sper'ts av kings an' bishops that rest on Cashel" (McAnally 1888, 49). I wrote at the time in my journal (Nickell 1971) that "the wind added 'atmosphere,' and with the cold grey sky, the cold grey stone, and the old graves, made an eerie place of 'The Rock.'"

Heidelberg Castle

Perched atop a ridge overlooking Heidelberg, the *Schloss* (castle) is the centerpiece of the scenic views of the city. Its grandiose ruins of striking red sandstone are well preserved and represent "one of Germany's finest examples of a Gothic-Renaissance fortress" (Schulte-Peevers 2002, 543).

During the second World Skeptics Congress held in the picturesque city, July 23–26, 1998 (see Frazier 1998), I found time to visit the castle, accompanied by fellow skeptic and former U.S. Air Force Major James McGaha.

Legends there abound. For example, one swirls about the castle terrace, where one can see a supposed "footprint" in the stone. This is purported to have been caused by a knight having leapt from a third-story window when a prince made an early return to his wife's bedroom (Schulte-Peevers 2002, 543).

Of course such an "explanation" of the alleged imprint is ridiculous on the face of it, since it would have taken a superhuman leap to have so impressed stone. Indeed, the common "footprint-in-the-stone" story element—or *motif*, as folklorists say—is typically attributed to the supernatural (see Nickell 2003a).

Still another legend at Schloss Heidelberg is obviously recounted not for its factual value but for its punchline. The tale focuses on the *Grosses Fass* ("great cask"), an enormous wine vat standing two stories tall in the cellar. Once the largest functioning wine vat in the world, it was reputedly made from 130 oak trees and has a capacity of some 50,000 gallons.

According to the legend, in the eighteenth century the vat's guardian was a dwarf named Perkeo, a court jester with a tremendous thirst for wine. Some say he could consume the contents of the Great Cask in a single draught ("Perkeo" 2005), while a more reasonable source states that he only attempted to empty it by drinking eighteen bottles daily for fifty years. One day, however, Perkeo substituted a glass of water—by accident, say most raconteurs—and died instantly! (Inowlocki 1999, 70–71; Knight 2002, 303).

The anecdote may have grown from a proverbial kernel of truth. Apparently, under the rule of the elector Carl Phillip, a Tyrolean dwarf, did serve as the court jester—a role that clever

dwarfs often filled (Nickell 2005, 107). Perkeo was supposedly a nickname deriving from his response, when offered wine, "*Perche no?*" ("Why not?"). An antique statue of Perkeo today stands next to the Great Cask (Knight 2002, 303; "Perkeo" 2005).

Castillo de San Marcos

The seventeenth-century Spanish-built Castillo de San Marcos in St. Augustine, Florida, is the oldest masonry fort in the continental United States. Constructed of coquina, a soft limestone formed by cemented seashells, it was begun in response to a raid in 1668 by English pirates. Construction started in 1672 and was completed after twenty-three years. It guarded Florida until that territory was ceded to England in 1763, and it imprisoned Americans during the Revolutionary War (Brownstone and Franck 1989, 8). It was returned to Spain in 1783, then purchased by the United States in 1819. Today it is a National Monument, operated by the National Park Service.

Of the many legends of the Castillo, none is more gruesome, more spine-tingling, more often repeated—and less substantiated—than that of the ghostly lovers in the fort's dungeon. As it is summarized in *The National Directory of Haunted Places* (Hauck 1996, 125).

> An eerie glow accompanied by the faint odor of a woman's perfume is sometimes detected near a wall in the dungeon of this 1672 Spanish fort. The wall was the ghastly tomb of Señora Dolores Marti and Captain Manuel Abela. Señora Dolores was the wife of Colonel Garcia Marti, assigned to the Spanish garrison in 1784. When Colonel Marti found out his wife was having an affair with Abela, he chained them to a wall in the dungeon and mortared a new wall of coquina stone in front of them.

In the next century an engineer noticed that a section of wall sounded hollow when tapped. "He chipped away the mortar, and the lantern he held illuminated two skeletons" (Moore 1998, 43). At least, this "supposedly" happened, according to another raconteur who stated more specifically that "There before him hung two skeletons, chained to the wall" (Lapham 1997, 147). That writer—along with his illustrator—seems not to know that bones are not wired together like the articulated skeletons in science classes, and instead of hanging as a unit they would have fallen apart, landing in a heap on the floor.

In fact, the legend represents an interesting example of how facts are embellished over time by those intent on fostering mystery.

First of all, there is no "dungeon" in the Castillo (despite its having been used as a prison on various occasions [Brownstone and Franck 1989, 8]). The area in question was actually a small room that was part of the powder magazine; it proved too humid for storing gunpowder and was sealed off. It was rediscovered, not in 1833, 1838, or 1938 as variously given (Hauck 1996, 125–126; Cain 1997, 22) but in 1832 "When a cannon fell through from the gundeck" (National n.d.; Harris 2004).

Reportedly "bones" were found among the debris in the room, but whether they were human appears far from certain. Concedes one source: "Many rumors and stories developed about the bones. Tour guides shortly after the turn of the century concocted all kinds of fascinating tales involving the 'dungeon room.'" Indeed, "Some stories were quite fantastic" (Cain 1997, 22), including, of course, the fable of the governor sealing his wife and her lover in that chamber. Although one source acknowledges that "history does not record the event" (Lapham 1997, 146), another, while agreeing, nevertheless offers the hope that "perhaps some visitors may still experience an eerie feeling when visiting the small room in the northeast corner" (Cain 1997, 22).

In 2004, when I visited the Castillo (for the third time) I was impressed with the professionalism of the staff. One told me, "There aren't any ghosts," explaining that he had slept there all night on occasion and experienced nothing. He said that places with genuine history did not need to use ghosts for tourist promotion—unlike those that "don't have anything else" (Cipriani 2004). The Castillo de San Marcos certainly has plenty of real history.

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Just the Facts, Ma'am: Empirical vs. Rationalist Approaches to Understanding

Skeptics tend to be empiricists. They want the facts. Indeed, it is this emphasis on empirically verifiable statements that makes all the difference between science and pseudoscience. Yet the long history of the debate between empiricists and rationalists—which eventually resulted in the methods of modern science—has been resolved in a more nuanced way: there is no hard and fast distinction between facts and theories but a continuous interplay that—if unacknowledged—can trip up your next investigation.

Rationalism is the ancient philosophical position that knowledge about the world can be derived primarily by the use of logical thought and reason. The most important early exponent of rationalism was Plato, with his famous allegory of the cave. He maintained that the real world is inaccessible to us directly; we only see its pale reflection through our senses, just like his imaginary prisoners chained to a wall inside a cave, who only see the shadows of what's going on outside. According to Plato, only the rational approach of the philosopher can bring us outside of the cave and allow us to directly grasp the world of ideas.

The rationalist program continued in philosophy until it reached its apex, and arguably its end, with René Descartes, the philosopher famous for his "*Cogito ergo sum*" ("I think, therefore I am"). Descartes set out to first question everything he knew (his "radical doubt") and then to re-derive all knowledge from the most basic possible premise: he was sure of his existence because he was capable of thinking. Alas, Descartes immediately runs into the obvious obstacle that there is not much else one can actually know by this route without invoking sensory information.

Plato's student, Aristotle, took a different path, emphasizing the primacy of observation and experiment over pure thought. (Not that Aristotle didn't appreciate rational thinking—after all, he did invent logic!) But we have to wait

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until Descartes and the difficulties encountered by the rationalist program in continental Europe to see the renaissance of empiricist philosophy, which took place in England thanks in particular to George Berkeley, John Locke, and especially David Hume. For the empiricists, all knowledge begins with the senses; but of course, they run into the same problem that bothered Plato to begin with: since we know that the senses can deceive us, how do we derive certain knowledge from them?

This impasse was tackled by the last great philosopher to write about these topics before modern science really took off: Immanuel Kant. Kant started out as a rationalist, indebted to Descartes. But then he read Hume, who, Kant wrote, "awoke me from my dogmatic slumber," thanks to Hume's stinging criticism of the rationalist approach. Kant then came upon what he referred to as his "Copernican revolution," a change in perspective that allowed him to make the next big step toward bridging the rationalist/empiricist divide. Kant realized that the way we perceive (empiricism) and think (rationalism) about the world is shaped by what he called "*a priori* categories," i.e., innate characteristics of the human mind, such as our ability to think of space and time or the concept of causality. In some real sense, therefore, our minds construct the world by channeling our thoughts and senses within the confines of the categories. Since Kant (who died in 1802) wrote before Darwin and the modern theory of evolution, he couldn't even begin to attempt an explanation of where these categories came from. But today we realize that they are the result of a long evolutionary history as social primates in certain environments (such as the savannas of the Pleistocene).

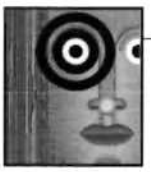
Another way to look at science as the happy marriage of empiricism and rationalism is to see that the two schools emphasized the two fundamental ingredients of modern science: empirical observations on the one hand (just the facts!) and logical/mathematical truth on the other. It is, however, amusing to see how the tension between the two approaches is still alive and well, as can be seen in the endless disputes about the alleged superiority of theory over experiments in physics or the instinctive distrust of mathematical modeling on the part of many practicing biologists.

Indeed, the opposition of theory and experiment permeates textbook explanations of "the" scientific method, where some authors stress that all science begins with observations (empiricism) while others point out that the hallmark of good science is hypothesis testing, so that one has to have an idea (rationalism) before one can begin any investigation. Darwin himself was famously accused of doing poor science by some of his contemporary philosophers (see "Thinking about Science," March/April 2004) and wryly observed, "How odd it is that anyone should not see that all observation must be for or against some view if it is to be of any service!"

The reality, as Kant began to see and modern philosophers of science readily acknowledge, is that science is a complex mixture of empiricism and rationalism, where the two contribute in a dialectical and inextricable fashion, rather than following a simple, linear flow chart as seen in many textbooks. So, the next time that we as skeptics demand "just the facts," we ought to be prepared to explain which facts are relevant to the question at hand, which in turn implies that we must already have some theory in mind, a theory that is a reflection of our mental structures and experiences. Not even the most careful skeptic can claim a completely objective vantage point from which to investigate the world. Both Kant and Hume would be very pleased by this acknowledgment. □

STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION (Required by 39 U.S.C. 3685)

Date of filing: September 12, 2005. Title: The Skeptical Inquirer. Frequency of issue: Bimonthly. Complete mailing address of known office of publication: 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Publisher: CSICOP (Committee for the Scientific Investigation of Claims of the Paranormal), Inc., 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Editor: Kendrick Frazier, 944 Deer Dr. NE, Albuquerque, NM 87122-1339. Managing Editor: Benjamin T. Radford, 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Owner: CSICOP (Committee for the Scientific Investigation of Claims of the Paranormal), Inc., 3965 Rensch Rd., Amherst, NY 14228-2713; P.O. Box 703, Amherst, NY 14226-0703. Known bondholders, mortgagees, and other security holders: None. Average number of copies of each issue during the preceding 12 months: (a) Total number of copies (net press run) 50,677. (b) Paid and/or requested circulation: (1) Paid/requested outside-county mail subscriptions stated on form 3541: 25,866. (2) Paid in-county subscriptions stated on form 3541: 0. (3) Sales through dealers and carriers, street vendors, counter sales, and other non-USPS paid distribution: 10,076. (4) Other classes mailed through the USPS: 0. (c) Total paid and/or requested circulation (sum of b[1], [2], [3], [4]): 35,942. (d) Free distribution by mail (samples, complimentary, and other free): (1) Outside-county as stated on form 3541: 1,035. (2) In-county as stated on form 3541: 0. (3) Other classes mailed through the USPS: 50. (e) Free distribution outside the mail (by carriers or other means): 0. (f) Total free distribution (sum of d and e) 1,085. (g) Total distribution (sum of c and f) 37,027. (h) Copies not distributed: 13,650. Total (sum of g and h): 50,677. Percent paid and/or requested circulation (c divided by g times 100): 97.1%. Number of copies of the single issue published nearest to filing date: (a) Total number of copies (net press run) 51,450. (b) Paid and/or requested circulation: (1) Paid/requested outside-county mail subscriptions stated on form 3541: 27,655. (2) Paid in-county subscriptions stated on form 3541: 0. (3) Sales through dealers and carriers, street vendors, counter sales, and other non-USPS paid distribution: 9,761. (4) Other classes mailed through the USPS: 0. (c) Total paid and/or requested circulation (sum of b[1], [2], [3], [4]): 37,416. (d) Free distribution by mail (samples, complimentary, and other free): (1) Outside-county as stated on form 3541: 800. (2) In-county as stated on form 3541: 0. (3) Other classes mailed through the USPS: 50. (e) Free distribution outside the mail (by carriers or other means): 0. (f) Total free distribution (sum of d and e) 850. (g) Total distribution (sum of c and f) 38,266. (h) Copies not distributed: 13,184. Total (sum of g and h): 51,450. Percent paid and/or requested circulation (c divided by g times 100): 97.8%.

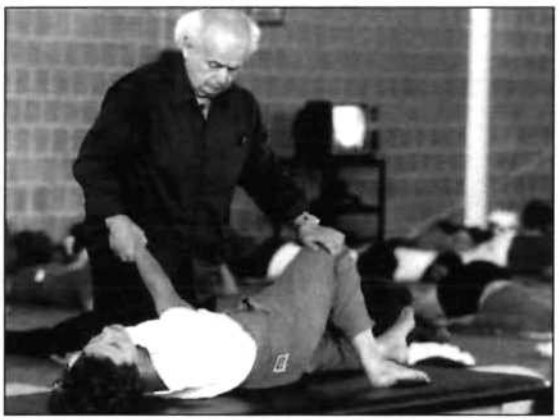


New-Agey Feldenkrais

Q: My sister-in-law is a Feldenkrais® practitioner. She always wants to give us treatments. What is this? Is it based in reality?

—B. Braid

A: Your skepticism is understandable, and this is a good example of how sometimes—well, rarely—what smacks of New Age mysticism may not be. The Feldenkrais Method was developed by Russian-born Isreali Moshe Feldenkrais (1904–1984), a physicist, engineer, and Judo instructor. Feldenkrais combined his knowledge of anatomy, psychology, and physics into a series of therapies designed to improve posture, increase flexibility and coordination, and reduce muscle pain and tension. The program is essentially a complex series of yoga-like positions, stretches, and movements. Many physical therapists use the techniques in their repertoire (especially for people recovering from illness or injuries), and practitioner training and sessions are offered through an organization called the Feldenkrais Guild of North America (which has trademarked any and all names related to Feldenkrais).



Feldenkrais using his Method on a patient.

The Feldenkrais Method enjoyed a height of popularity in the 1970s and early 1980s, but has receded in importance since then. This is due, at least in part, to the often obscurant tone of Feldenkrais's writings. In Feldenkrais's most popular book, *Awareness through Movement* (1972), he devotes nearly twenty pages to explaining good posture, and includes section titles such as "Man's capacity to learn replaces the instincts of the animals" and "Performance is improved by the separation of the aim from the means." I don't doubt that there is more to analyzing and instructing good posture than simply sitting upright, but this seems a bit excessive. Feldenkrais proponents don't do themselves any favors by describing the Feldenkrais Method as "utilizing functionally based variation, innovation, and differentiation in sensory motor activity to free us from habitual patterns and allow for new patterns of thinking, moving, and feeling to emerge."

Though the Feldenkrais Method steers clear of New Age and mystical connotations, it does share much of the same language often found in pseudoscience-based therapies, with its emphasis on imagination and notions of "wholeness," "new patterns of feeling," and so on. Many physical and massage therapists offer Feldenkrais therapy along with unproven therapies such as Reiki, aromatherapy, and reflexology. Feldenkrais therapy seems to be on fairly solid (if mundane) medical and scientific bases; it doesn't claim to treat or cure any disease (though the Feldenkrais Guild of North America's Web site asks, "Does your back hurt? Do you have trouble focusing your attention?"). Like any series of movements and stretches, from Tai Chi to yoga, many will find it helpful. We can all use a reminder to sit up straight—at least a page or two of it. □

Benjamin Radford is the managing editor of the SKEPTICAL INQUIRER*; his first book, co-authored with Bob Bartholomew, was* Hoaxes, Myths, and Manias: Why We Need Critical Thinking.

Ask the Skeptic

Wondering whatever happened to red mercury or Uri Geller? Heard about some dubious paranormal or fringe-science claim? Ask the skeptic! Submissions can be sent to: The Skeptical Inquiree, Skeptical Inquirer, P.O. Box 703, Amherst NY 14226 (or bradford@centerforinquiry.net). Not all queries can be answered, and submissions may be edited for clarity and length.

DOUBT AND ABOUT
CHRIS MOONEY

Science Wars II: Science and the Bush Administration

For policy wonks and issue advocates, a new area of specialization has recently arrived on the scene: "scientific integrity." Bills on the subject have been introduced in Congress. Interest groups, such as the Union of Concerned Scientists (UCS) and Public Employees for Environmental Responsibility (PEER), now specialize in tracking political interference with science. Foundations are dedicating energy and funding to the area; journalists, commentators, pundits, and bloggers have also climbed on board. One (yours truly) even has a book just published on the subject. There's room, it almost seems, for a career here.

Chris Mooney, a journalist specializing in the relation of science and politics, is the Washington correspondent for Seed *magazine. His book,* The Republican War on Science, *has just been published by Basic Books. He is a* SKEPTICAL INQUIRER *contributing editor and the Doubt and About columnist for www.csicop.org.*

All of this activity has been triggered by repeated charges that the Bush administration has reached a new low in its willingness to twist and undermine scientific information to suit desired policy objectives. Such accusations have a four-year history, stretching from early concerns over whether the administration would even name a science adviser, through 2001 debates over stem cells and global warming, past reports complied by members of Congress denouncing the administration's meddling with science going on at federal agencies and the composition of scientific advisory committees, and up to a landmark moment: a February 2004 statement by the Union of Concerned Scientists (and assorted scientific community superstars) that denounced the Bush administration for unprecedented and systematic abuses and misuses of science.

Whistleblowers from branches of government ranging from the Climate Change Science Program to the Bureau of Land Management have come forward with stories of cynical informational meddling. . . .

However, the story doesn't end there. If anything, it has gathered momentum since the pivotal UCS statement, as new anecdotes and examples have repeatedly popped up, suggesting that the Bush administration hasn't learned the error of its ways. Whistleblowers from branches of government ranging from the Climate Change Science Program to the Bureau of Land Management have come forward with stories of cynical informational meddling that have made the front pages of papers including *The New York Times* and *The Los Angeles Times.* Meanwhile, the UCS and PEER have begun to survey scientists within federal agencies—so far, they've tackled the Fish and Wildlife Service and the National Marine Fisheries Service—to determine whether they think political players are meddling with scientific information. Scores of surveys have now come back with answers in the affirmative.

Perhaps most important of all in focusing attention on the issue of "scientific integrity" have been the climate-change fiascoes in the run up to the G8 summit. Shortly before President Bush departed for Gleneagles, Scotland, whistleblower Rick Piltz dropped a bomb with his revelations, reported in *The New York Times,* that a political appointee at the White House Council on Environmental Quality (who had formerly worked at the American Petroleum Institute) had taken a metaphorical red pen to government climate-science reports and inserted language that had the effect of magnifying uncertainty about various conclusions.

A media frenzy began as this same individual—Philip Cooney—then resigned and promptly went to work at ExxonMobil, now perhaps the leading corporation encouraging skepticism about the ongoing climate crisis.

All of these events have had a cumulative effect, making it virtually impossible to take seriously the ongoing denials from the White House that any undue influence is being brought to bear on science. Those denials do, of course, persist; with each new revelation comes a dutiful response: "There's nothing out of the ordinary here"; "This is a typical interagency review process"; "The debate here is really over policy, not science"; and so forth. But such replies don't hold up very well when you consider that the critics of the administration are themselves current or former government-agency scientists who know very well what an "interagency review process" is and nevertheless insist that such processes have been corrupted in this administration. Even if we concede that some of these whistleblowers may have axes to grind, we're nevertheless left with a huge horde of disgruntled government scientists who can't possibly all be wrong.

Where does that leave us? Assuming—as I think we must, given all of the evidence—that something alarming is happening here at the interface between science and politics, it's worth asking why exactly that might be so. My conclusion is that what we're seeing is the result of a certain type of constituency-driven politics, in which federal agencies get staffed with Republican political appointees who know very well who their friends are and are willing to listen to them on matters of science. So business interests get their "scientific" arguments privileged at agencies that are supposed to be protecting endangered species and the environment, even as religious conservative interests get their "science" humored at agencies dedicated to public health and even, to some extent, medical research.

We don't have to postulate a nefarious conspiracy, then, to explain the war on science that has manifested itself during the second Bush administration. We need only point to an army of political appointees in government agencies who are going about their jobs the only way they know how—i.e., talking a lot to their industry or Religious Right allies and frequently rewarding their lobbying attempts in scientific areas. In short, it's a politico-scientific spoils system. And as this particular spoils system proceeds to allocate rewards, it simultaneously undermines, cheapens, and compromises federal agencies as reliable, public-oriented sources of scientific analysis and information.

Tom Collina (left), director of the Union of Concerned Scientists Global Security Program, addresses reporters. (FILM) AFP Photo/Mario TAMA

But if we're looking at a government-wide problem based on staffing and a culture that has developed within federal agencies, that suggests it won't be easily solved. In fact, the damage done could long outlast the Bush administration, because the integrity of the federal government will have been compromised and because taxpayer-funded agencies may not recover quickly (or at all) from the traumas they've been put through. Here's where the political abuse of science becomes a core issue for the nation's future: The crisis promises to leave Americans with a less reliable, less effective, less professional, and ultimately less respectable government. The consequences will be felt in a wide range of areas, ranging from public health to the environment.

In conclusion, then, "scientific integrity" emerged virtually out of nowhere as a central issue under the Bush administration, and has since transmogrified into a broad-scale concern about good governance and the effectiveness and integrity of agencies funded by the public purse. The standard way to address concerns about good government is to initiate reform, and momentum has now begun to build in support of precisely that outcome, at least among Democrats in Congress. (Though there are prominent exceptions, most GOP representatives remain unwilling to seriously investigate or criticize the Bush administration.) In the meantime, however, political science abuse shows no sign of going away. And already, the wounds it has inflicted may take a very long time to heal. □

Does Irreducible Complexity Imply Intelligent Design?

Michael Behe's "irreducible complexity," according to "design theorists," implies Intelligent Design of biological systems. In fact, such a conclusion lacks a logical foundation. Irreducible complexity can even more reasonably be construed as an argument against Intelligent Design.

MARK PERAKH

Michael Behe is a university professor of biochemistry. Although he has to his credit a number of papers published in professional journals on biochemistry, he is much better known as the author of the popular book *Darwin's Black Box* (Behe 1996). Widely reviewed, both exorbitantly acclaimed and sharply critiqued, this book introduced the concept of "irreducible complexity" (IC) of protein systems in biological cells. IC, according to Behe, is a common feature of very complex protein "machines" performing vital functions in bio cells. A protein assembly which is IC, according to Behe, can only properly function if all of its constituent proteins are present; if even a single component of such a system is missing, the system becomes

nonoperational. If a system is IC, concludes Behe, this indicates it cannot be a result of "blind" evolution but more reasonably has to be attributed to "design."

Michael Behe's concept of irreducible complexity (IC) (Behe 1996) has been critically discussed by experts in biology. The attitude of many professional biologists to Behe's IC concept has found its most uncompromising expression in Kenneth Miller's words: ". . . the notion of irreducible complexity is nonsense" (1999, p.150).

While critical analysis of IC by professional biologists seems to be sufficient to dismiss Behe's alleged great discovery in biology, there is another aspect to IC which, to my mind, makes the very notion of "IC implies Intelligent Design (ID)" implausible.

A concept that's identical in all but name to irreducible complexity was around for a long time before Behe. It was applied to the problems with the evolution of various anatomical structures, such as the mammalian eye (recall the many-times-answered question, "What good is half an eye?") or snakes' apparatus for venom injection (Marcell 1976).

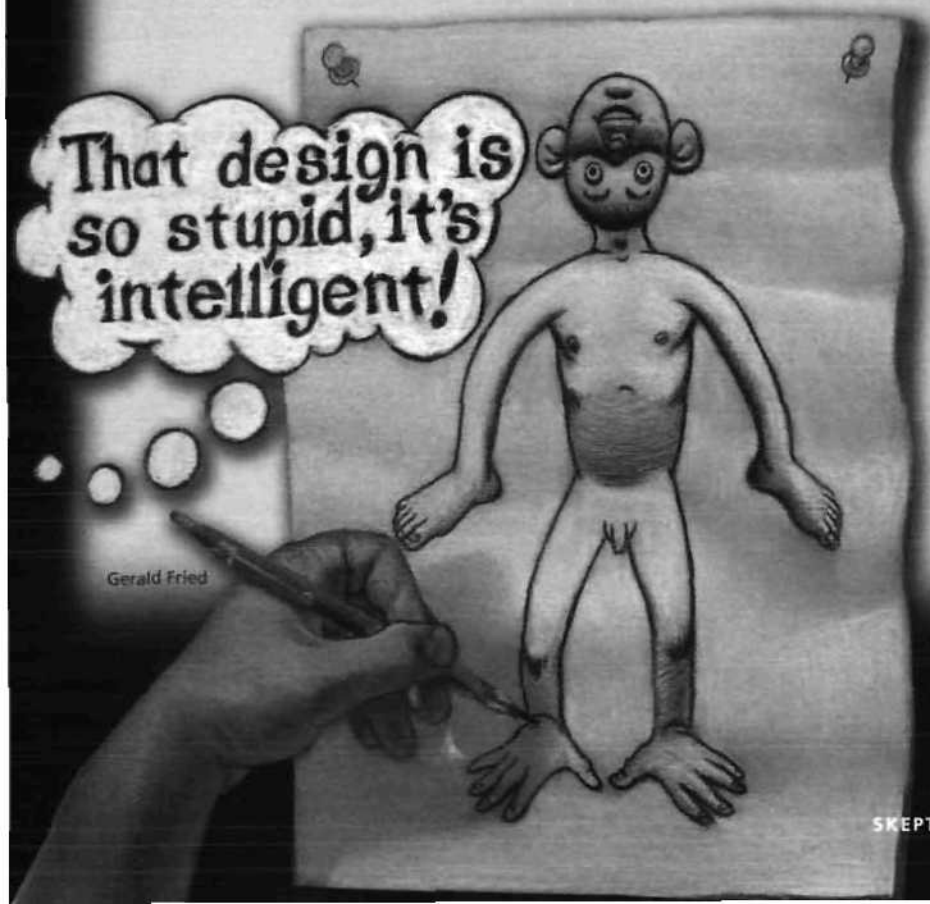
An even more relevant and practically identical concept, "interlocking complexity," had been already discussed from the standpoint of genetics nearly eighty years earlier (Muller 1918, 1939). Even the application of the concept of IC to the molecular assemblies within a biological cell (which is Behe's playing field) was put into circulation some ten years before Behe (Cairns-Smith 1985). Unlike Behe and his supporters, these predecessors did not claim that irreducible complexity constituted a great discovery or implied Intelligent Design, so this prior version would hardly invoke Miller's categorical rejection quoted above.

The critical discussion of Behe's idea has mainly concentrated on three specific aspects of IC:

1. The very definition of IC has been a subject of much discussion. For example, Behe's colleague, William Dembski (viewed by the ID advocates as their leading logician), admitted that Behe's idea of IC was "neither exactly correct nor wrong" (Dembski 2002, 280).

2. The question of whether molecular systems offered by Behe as examples of IC are indeed IC has likewise been subject to critique. A number of biologists pointed out that systems such as bacterial cilia or blood-clotting cascades which, according to Behe, exemplify IC, are in fact reducible without losing their "basic function." (See, for example, Miller 1999.)

3. Behe asserts that IC systems, exemplified by the protein assemblies in biological cells, cannot have evolved via a direct "Darwinian" path because such a path necessarily goes through a sequence of intermediate stages at which the system performs the same "basic" function. Since any system comprising fewer parts than the IC system in question is, by definition of IC, dysfunctional, it could not be an evolutionary precursor of an IC system, or so says Behe. Regarding the evolution of an IC system via an *indirect* evolutionary path, Behe admits that such a



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process is possible but, in his opinion, so highly improbable that it cannot be considered a feasible option.

The last point has been disputed by professional biologists. They suggest detailed scenarios showing how, for example, a bacterial flagellum could have evolved from evolutionary precursors with a sufficiently high likelihood (Matzke 2003, Ussery 2004, Musgrave 2004). The consensus of the vast majority of professional biologists seems to favor the views of Behe's opponents. Except for vague protestations, wherein Behe and his supporters demand from their opponents highly detailed proofs of the factual occurrence of indirect evolutionary paths leading to IC systems, Behe seems to be unable to offer substantive counterarguments.

Behe has **not** provided a **definition** of complexity. Several such definitions have been suggested, though, by Dembski—whose various definitions of complexity are often **incompatible** with each other.

Even if the IC concept is valid, and even if many biological systems are indeed IC, this in itself does not logically lead to the design inference. I contend that IC in itself can more reasonably be construed as an argument *against* the design inference.

In an essay titled "Irreducible Contradiction" posted on the Internet in 1999 (Perakh 1999), I suggested critical comments to Behe's *Darwin's Black Box.* In the nearly six years since that essay appeared, Michael Behe has never uttered a word acknowledging the existence of my critical remarks. Nor has William Dembski, who has actively promoted Behe's concept of irreducible complexity, ever mentioned those comments. Neither did anybody else from the Intelligent Design camp.

Recently, Dembski posted an article titled "Irreducible Complexity Revisited" (Dembski 2005) that has initiated some discussion (RBH 2005, Perakh 2005). And an op-ed article by Behe appeared recently in *The New York Times,* wherein Behe repeats the same much-critiqued notions without having changed his position or having accounted for a single point suggested by his critics. I think, therefore, it is worthwhile to revisit certain points that seem to need clarification regarding the IC concept and its alleged logical segueing into ID.

I'll not discuss here Dembski's recent modifications of the IC definition (addressed in Perakh 2005 and RBH 2005). Instead, I will refer to Behe's original definition of IC, which, although suffering from certain deficiencies (as admitted by Dembski [2002]), does essentially reflect his principal idea.

The essence of Behe's original IC concept is as follows:

A system is irreducibly complex if:

a) It consists of several parts.

b) The parts are "well-matched." (Behe offered no definition of the notion of being "well-matched.")

c) It performs a certain "basic" function (for example, it clots blood).

d) It ceases to function if even a single part is missing.

Having discussed several examples of protein "machines" in biological cells that, according to Behe, are IC, Behe then asserts that the existence of IC systems in biological cells points to them being designed rather than having emerged as a result of evolution. I intend to show that Behe's assertion contradicts logic.

Note that Behe's concept of IC comprises two components: one is *complexity* and the other is *irreducibility.*

Behe expends a great deal of effort demonstrating how staggeringly complex the protein systems in a cell are. It is evident that for Behe, the complexity in question is part of his idea, which points to design as the alternative to evolution. According to Behe, biological systems must have been designed because they (A) are very complex and (B) cannot function unless all of their parts are present.

Regarding A, note that Behe has not provided a definition of complexity. Several such definitions have been suggested, though, by Dembski—whose various definitions of complexity are often incompatible with each other. There is among them a definition repeated by Dembski many times, which is in tune with Behe's point A. According to that definition, complexity is equivalent to small probability (Dembski 1998). For example, Dembski asserts in his book that "probability measures are disguised complexity measures" (114). Variations of this assertion are scattered over Dembski's books. In this view, the more complex a system, the less probable its spontaneous emergence as a result of chance. According to Behe and Dembski, the more complex a system, the more likely it was designed—this is the essence of point A in Behe's concept.

Point B (irreducibility) in Behe's concept asserts that an IC system loses its function if even a single part is missing. According to Behe, protein "machines" in a cell meet both requirements for being IC—they are very complex and they are irreducible. What if this assertion is true? Does it lead logically to the design inference? Behe's answer is yes. However, I submit that that answer is illogical, and here is why (starting with complexity):

Contrary to Dembski's persistent assertions, complexity is certainly not just disguised improbability. Examples to the contrary abound. Imagine a pile of stones. Each stone has some irregular shape that resulted from a series of chance events. Among these irregularly shaped stones, we find a perfectly

rectangular brick. It has a simple shape that can be described by a simple equation containing only three numbers—width, length, and height. On the other hand, each of the irregularly shaped stones can be described only by a more complex program containing many numbers. However, the probability of a rectangular brick being produced as a result of chance is low; the brick can reasonably (with a high probability) be assumed to be a product of design. For irregularly shaped stones, the opposite is true—the probability of their having been created by chance is larger than the probability of their having been created by design. Here, the relationship between probability and complexity is the opposite of the one prescribed by Dembski's definition (but compatible with the definition of Kolmogorov complexity [see the box to the right and, for example, Chaitin 2003]).

Kolmogorov Complexity

This concept is part of the Algorithmic Theory of Information/Probability/Complexity (ATP) whose main creators were were Ray Solomonoff, Andrei Kolmogorov, and Gregory Chaitin. Complex systems are represented in ATP as strings of binary numbers. If the structure of such a string incorporates certain *regularity*, i.e., it is not fully random, it can be encoded by a computer program containing an instruction of how to generate the string in question, which program is *shorter* than the string itself.

The *Kolmogorov complexity* of a system is a quantity that equals the size of the *shortest* program that encodes the system in question if the latter is represented by a string of digits. The longer the *minimal* possible "encoding" program for a system, the larger is the Kolmogorov complexity of that system. The more random a system, the larger its Kolmogorov complexity.

In the case of the stones and the brick, simplicity rather than complexity is a marker of design. This shows not only that Dembski's definition of complexity fails for certain situations but also that, generally, a more reasonable statement is that simplicity points to design while complexity *as such* points to chance (more about this in Perakh 2004). If this is so, then the first part of Behe's IC concept—complexity—is more reasonably construed as an indication of "blind" evolution rather than of design.

Turning to the second part of Behe's IC—irreducibility—recall that Behe's idea is that the loss of a single part of a protein "machine" makes it nonoperational. Therefore, says Behe, such a "machine" could not have evolved via a "Darwinian" evolutionary process, which requires the existence of functional precursors.

The simple fact is, though, that if an IC system has been designed, it is a case of *bad design*. If the loss of a single part destroys the system's function, such a system is unreliable, and therefore, if it is designed, the designer is inept. When engineers design machines, bridges, skyscrapers, TV sets, or artificial kidneys, they always try to envision what can go wrong with their design and how to ensure that small defects do not result in a failure of their products: they build in certain redundancies so that in case some part of the construction fails, its function will not be completely lost but rather taken over by certain self-compensatory features.

IC systems, by definition, are highly vulnerable to accidental damage. Therefore, if IC systems are designed, they are poorly designed.

It must be stressed that in this case, we go beyond the problem of suboptimal design. When we deal with just suboptimal design, the ID advocates use various arguments that supposedly justify the reasons for a design being not optimal. For example, one such argument is that we simply don't know anything about the designer's reasons to behave as he does; hence, our notion is just an argument from ignorance. Perhaps what looks like suboptimal design from a limited human standpoint has good reasons, that are beyond our comprehension, to be as it is. Such an argument usually, albeit not always explicitly, presumes that suboptimality is a "side effect" rather than a deliberate goal of the designer.

Whether such arguments are convincing depends on the mindset of the person who hears them. For this discourse, however, such arguments are not really relevant. Indeed, Behe's concept contains, as a crucial part, the assumption that the irreducibility of a biological system is a marker of design. Such an assumption obviously does not refer to a designer who has failed to provide an optimal solution or compromised in his design for some unknown reason. It is no longer about some "side effect" that the designer has simply failed to correct or has kept for unknown reasons that are extraneous to the design's purpose.

Behe assumes that the very feature that makes the design bad indicates that the system has been designed. In other words, Behe's concept entails that suboptimality not be viewed as just an unfortunate oversight by the designer nor as something that, albeit seemingly detrimental to the designed entity, has some reasons known only to the designer but unfathomable to us. No, in Behe's conception, the very suboptimality is suggested as a marker of design: an IC system by definition is easily destroyed by damaging just a single part, so a system's being IC means that its vulnerability is its ineliminable feature. Behe's idea implies that the system is irreducibly complex (and hence suboptimal) because such was the goal of the designer. "The system is suboptimal, *therefore*, it is a product of design"—that is what Behe's concept entails.

ID advocates are welcome to accuse me of offering a caricature of their idea, but it cannot be helped when an idea's essence sounds like a parody; the idea that "IC implies ID" can most succinctly be rendered by a maxim: stupid, therefore designed.

If this is a satisfying logic, I don't know what a lack of logic is.

Remember also that Behe's design inference is based not on some positive evidence but rather on a negative assertion: IC systems could not have evolved via a "Darwinian" path. Since such a path is impossible, concludes Behe, the only remaining option is design.

This is an argument of the either-or type. I will not discuss here whether or not there are indeed only two mutually exclusive options. My point is different: if Behe infers design only because the direct evolutionary path, in his view, is impossible and an indirect evolutionary path is improbable, then to be consistent, he should use the same probabilistic criteria for judging whether or not it is reasonable to assume that the feature that makes design bad is a marker of design. How probable is it that the putative designer deliberately designs his products to be irreducibly complex if that means the product will be unreliable?

Dembski asserts that ID does not imply a *smart* designer (Dembski 2001). The designer can even be stupid, says Dembski. However, from many other utterances of ID advocates, including Dembski, it is clear that all such statements are just a smoke screen and, in fact, they believe that their "designer" is the God of the Bible. (See, for example, Dembski 1999, part 3, or Johnson 2000.) This designer is supposed to be omnipotent and omni-benevolent.

In fact, ID advocates want to have their cake and to eat it too. On the one hand, they concede that the putative designer may be stupid—this they say when trying to explain suboptimality of design. On the other hand, they speak about Christian values, cultural war, the Logos of John's gospel, and the imminent triumph of ID over "materialistic" science. (Dembski 1999, part 3; Johnson 2000). It is not by accident that the leading young-Earth creationist, Henry Morris, who is more consistent in his frank biblical literalism, referred to Dembski's contortions regarding the nature of the designer as "nonsense" (Morris 2005).

How probable is it that the very features that make a design bad are markers of design (as follows from Behe's discourse)? It is hardly less improbable than the evolution of protein assemblies via indirect "Darwinian" paths.

If Behe infers design just because evolution of protein assemblies via indirect "Darwinian" paths looks improbable to him, design inference also has to be excluded because of the improbability of the putative designer's deliberately incorporating in the protein assemblies the very features (like IC) that make the design bad.

The above discourse is, to my mind, sufficient to reject the design inference based on the notion that IC implies ID as logically untenable.

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Only a Theory?

Framing the Evolution/Creation Issue

Evolution opponents are framing the issues to our disadvantage; they focus on the phrase "theory of evolution," when theory *is today understood by the public as a tentative concept unsupported by evidence.*

DAVID MORRISON

Public opinion polls tell us that we are losing the battle to explain the nature of evolution and the central role that evolutionary concepts play in modern science. Tens of millions of Americans scoff at evolution and try to protect their children from what they consider to be a pernicious concept.

Given the overwhelming scientific support for evolution, we must be doing something wrong in discussing this issue with the public. There are several ways in which scientists and educators might enhance their effectiveness in this debate. The problems relate to framing the issues, or rather, allowing the opponents of evolution to frame them. Framing involves the selective use of language or context totrigger responses, either support or opposition. We see it in the often deceptive titles of legislation, such as a "clear skies act" or "forest renewal act" or, on the other side, a "death tax." "Pro-choice" or "pro-life" advocates are always careful to frame their position with the proper emotion-charged terms. (The subject is artfully described in George Lakoff's book *Don't Think of an Elephant.*)

As a prime example, we doom our communications efforts with many nonscientists by defending the "*theory* of evolution." *Theory* is quite simply the wrong word. Polls indicate that three quarters of Americans agreed that "evolution is commonly referred to as the theory of evolution because it has not yet been proven scientifically." Those who advocate adding "only a theory" disclaimers in textbooks know that to call evolution a *theory* is sufficient to undermine its acceptance.

Channeling the discussion into a debate over the "theory of evolution" is an example of framing. Since the great majority of Americans understand the word *theory* to imply uncertainty and vagueness, the name itself predisposes the answer. It is as if a criminal defendant were described by the judge and other court officials as "the murderer." Not many juries would want to let a known murderer free, no matter how the evidence was presented. The one who frames the debate often wins.

Yet many proponents of evolution seem content to argue about the "theory of evolution" and its educational role. As scientists, they were taught that a scientific theory is a systematic set of principles that has been shown to fit the facts, and has stood up against attempts to prove it false. A theory is thus the highest level of understanding, synthesizing a wide variety of observations and experiments. But that is not what the word *theory* means to 99 percent of Americans, including many scientists and educators when they are outside the classroom.

Dictionaries have noted the changing definition of this word. Older dictionaries give preference to the scientific definition and consider the use of *theory* to refer to a guess or hunch to be a form of slang. Today, the slang meaning prevails, and a theory is a belief, something taken to be true without

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SI on Evolution and ID

Here is a list of some other SKEPTICAL INQUIRER *articles on Intelligent Design and creationism.*

—Editor

- Charles Sullivan and Cameron McPherson Smith, "Getting the Monkey off Darwin's Back: Four Common Myths about Evolution," May/June 2005
- Dennis R. Trumble, "One Longsome Argument," March/April 2005
- Robert Camp, "'Teach the Controversy': An Intelligently Designed Ruse," September/October 2004
- Bruce and Frances Martin, "Neither Intelligent nor Designed," November/December 2003
- Mark Perakh, "A Presentation without Arguments: Dembski Disappoints," November/December 2002
- Mark A. Wilson, "'Geology Confronts Creationism': An Undergraduate Science Curriculum," January/February 2002
- Randy Moore, "Educational Malpractice: Why Do So Many Biology Teachers Endorse Creationism?" November/December 2001
- Taner Edis, "Darwin in Mind: 'Intelligent Design' Meets Artificial Intelligence," March/April 2001
- David Roche, "A Bit Confused: Creationism and Information Theory," March/April 2001
- Martin Gardner, "Intelligent Design and Phillip Johnson," November/December 1997 (our earliest article on ID)

News Articles/Editorials:

- "Time for Science to Go on the Offense," July/August 2005
- "AAAS Board Urges Opposing 'Intelligent Design' Theory in Science Classes," March/April 2003
- "Botanical Society of America's Statement on Evolution," November/December 2003
- "Bogus Poll of Scientists Latest Twist in ID/Creationists Fight against Science Standards," November/December 2003
- "American Association of Physics Teachers Statement on the Teaching of Evolution and Cosmology," January/February 2000
- "Science Trumps Creationism in New Mexico," January/February 2000

proof, an assumption, a suggestion, a hypothesis. Similarly, *theoretical* is used as a synonym for *tentative*, an idea that has not been tested with observations.

How do we really use the term in everyday language? A theory is a hunch that a detective comes up with in a murder mystery. It is one of several competing ideas, none of them proved. Fringe theories and conspiracy theories are crazy ideas that are out of the mainstream. New medicines or changes in the tax laws may be good in *theory* but don't work in practice. Among some scientists, theorists are thought to lack solid grounding in the facts (see the accompanying sidebar).

What about scientific usage? We don't hear much anymore about the Theory of Gravitation, or the Atomic Theory of Matter, or the Theory of Plate Tectonics. These phrases have a vaguely antique flavor. Gravitation and atoms and plate tectonics are accepted as legitimate subjects that don't need the preface "Theory of." The only two areas where "Theory of" remains in common use are Theory of Relativity and Theory of Evolution. Relativity is associated with Einstein, a genius whose work was abstract and unintelligible to laypeople. I doubt if most people realize that the principles of relativity have been tested, or that relativity has practical implications, for example in calculating the interplanetary trajectories of spacecraft. Judge for yourselves what this association implies for "Theory of Evolution."

There is another usage that should be mentioned: *theory* as a discipline, such as organization theory, color theory, economic theory, music theory, etc. These phrases imply the existence of a knowledge base or conceptual framework, and their names are given to university courses or areas of specialization. In science there are chaos theory, cosmological theory, information theory, and—yes—evolutionary theory (as used in the title of Steve Gould's last book). This usage is, however, rarely discussed in arguments about "only a theory."

If we accept the framing that calls this topic the theory of evolution, we face a dilemma. Some people just ignore the problem and concentrate on presenting the facts of evolution. They may believe that these facts and their implications are self-evident. But the human brain does not always work that way. We have seen recent examples. The majority of voters who supported the 2004 re-election of George W. Bush told pollsters that they believed that Saddam Hussein had weapons of mass destruction and that he had been behind the September 11 terrorist attacks, despite countless news stories to the contrary. Many people believe that airplanes are more dangerous than cars, no matter what risk statistics are presented. Even after well-conducted trials showed that herbal medicines such as echinacea are ineffective, public sales have remained strong.

Alternatively, many scientists and educators recognize the public misunderstanding of the scientific term *theory* and try to explain this to the audience. In her excellent book *Evolution vs. Creationism*, Eugenie Scott devotes much of the first chapter to the scientific meaning of the terms *theory*, *hypothesis*, *falsification*, etc. However, few members of a nonscientific audience

Real-world Use of the Word *Theory*

The following examples were encountered in the summer of 2005:

From a Space.com story:

> End of Conspiracy Theories? Spacecraft Snoops Apollo Moon Sites
>
> Fringe theorists have said images of the waving flag—on a Moon with no atmosphere—and other oddities show that NASA never really went to the Moon.

From a *San Jose Mercury News* story on the mystery that no tsunami was generated by Indonesia's 8.7 earthquake of March 28, 2005:

> Scientists have two theories about what happened Monday. Either no tsunami was produced, or one was formed but headed out to sea and away from populated areas. Eric Geist of USGS said "We'll just have to wait and see."

From the California Academy of Science exhibit on fossils in the San Francisco Airport, August 2005:

> Scientists have a number of theories about why ammonites develop spines on their shells.

From *Skeptical Briefs* (June 2005, vol. 15 no. 2):

> [Some cancer treatments] seem promising in theory, but don't work in fact.

From *The New York Times*, July 22, 2005:

> Echoes and Theories, but No Solid Links in London Bombings
>
> Investigators said their leading theory was that the latest attempted bombings were a copycat-style attack.

From David Brooks on PBS, in reference to speculation about Karl Rove:

> This is a case where the theory has gotten way out in front of the facts.

From a NPR commentary on health care, August 2, 2005:

> False positives in blood tests are a theoretical possibility, but are rare in practice.

From the History Channel special "Ape to Man," August 2005:

> Human evolution remained little more than a theory until evidence was found. . . .

with concerns about teaching evolution to their children are ready to accept that this word, whose meaning they know perfectly well, has in fact an almost opposite definition in science. Thus before asking the audience to consider that their opinions about evolution might be wrong, we start by asking them to accept a contrary definition for a familiar word. Anyone who teaches knows how hard it is for students to unlearn things they already know and believe. So why do we accept this wholly unnecessary burden when discussing evolution? No wonder those who frame evolution as a theory often win.

We should be discussing simply evolution, the same way we might discuss plate tectonics or genetics or any other branch of science. To debate the "theory of evolution" is a trap. It is letting our opponents frame the discussion to their benefit. Once we stop defending the theory of evolution, we are also free to criticize "only a theory" disclaimers in textbooks without apology or diversionary explanations.

The Either/Or Fallacy

The concept of framing has other implications for the creation-evolution debate. One that we are all familiar with is the effort to portray this as a choice between two models—godless evolution versus divinely inspired creationism. In a two-model formulation, any perceived difficulty with evolution becomes support for creationism. We should not accept this framing of the conflict. Actually, I would think that today it would be obvious that there are at least three models on the table: evolution, the young-earth creationism of biblical literalists, and the more sophisticated concept of Intelligent Design (ID), which accepts the age of the universe and the change in Earth's biota over time. It is a tribute to the discipline of the anti-evolution camp that they have avoided most public debates between the biblical literalists and ID. But we are free to exploit this split and to ask which alternative is proposed to be taught alongside evolution in science classes.

Most opponents of evolution in the schools are Christian fundamentalists, and many of them believe that evolution is a moral issue, a struggle between the forces of good and evil. Obviously proponents of evolution do not see it this way. What we want is a level playing field where we can present the facts. But as noted above, facts often lose out in a confrontation with deeply held beliefs.

To achieve a level playing field, we should avoid debating evolution in a religious context. Specifically, we should not speak on these issues in a church other than our own. In an unfamiliar church speaking to an audience of like-minded opponents of evolution, all the cards are stacked against us—not because there is anything antireligious about evolution, but because the audience *believes* there is. This situation also creates a temptation to debate religion itself, such as arguing about the "true" message of the first book of Genesis or contrasting the beliefs of Roman Catholics and fundamentalist Protestants. This is not likely to be a winning strategy for the scientist, who is again a victim of framing.

An Issue of Values

Many antievolutionists base their opposition not on scientific issues, but on their belief that evolution threatens their value system, specifically their family values. I don't see why we should not face this issue directly. Family values are not the monopoly of the creationist advocates. Most in these audiences will share a common interest in the education of their children, which is a fundamental American family value.

If I were speaking to an audience of parents, I would stress that evolution is central to many sciences, and that one cannot be a scientist without understanding it. I would note that students who don't understand evolution will have trouble getting into the best colleges. I would comment on the great number of scientists and engineers being graduated in "competitor" countries like China, and note that American students are not top scorers in international science tests. We can make a persuasive and nonpartisan case that the future of the nation depends on its scientific and technical literacy. Relatively few Americans will reject such arguments and state a preference for ignorance. Teaching evolution is part of a bigger issue of the competitiveness and economic well being of the nation (and of the state and local community). This is a real issue of values, for our children and their futures. And it is an issue that might appeal to lay members of school boards and textbook selection committees.

Health is another value issue. Medical research is supported by Americans across a wide political spectrum. How many people understand the role of evolution in the development of new medical treatments? Or the place played by genetics in creating new drugs? There is no more dramatic (or scary) example of evolution than the emergence of drug-resistant pathogens, as well as recent diseases such as AIDS. Newspaper stories about threatened pandemics due to mutations in avian flu or other emerging viruses can only be understood in an evolutionary context. Suppressing the study of evolution cuts off future opportunities to improve public health. Surely this values argument has wide appeal.

Beyond Biology

We also suffer when we accept that evolution should be debated purely in terms of biology and biology courses. In the present American public school system, these courses are already watered-down so that evolution is likely to be mentioned in only or one or two chapters or discussed in only one study unit of a biology course. It is easy to belittle a subject that seems so marginal. We should reframe this issue in terms of crosscutting ideas that affect all science. The audience should know that evolution and the concept of deep time are essential to geology and astronomy and genetics and pharmacology as well as high-school biology. It is also an opportunity to tell an audience how many people in this country are working in evolution-related jobs. If the audience comes from a traditional conservative religious background, they may have no idea that evolution is widely accepted among scientists and medical professionals and that it contributes to the livelihood of many Americans.

Many conservative Americans support competition and believe that free-market economic conditions are essential to national success. Most of them would be shocked to know that this philosophy has traditionally been known as social or economic Darwinism. Perhaps we should note that Darwinian natural selection is in many ways nature's equivalent to free-market competition. The other side of this argument addresses the belief that evolution leads to socialism and communism. Perhaps it is worth noting that Stalin's support for the anti-Darwinian biologist Trofim Lysenko set back Soviet agriculture for a generation and contributed to the starvation of millions of Russians.

Finally, we can reframe the issue in terms that do not immediately offend a conservative religious audience. The context in which most opponents fear and reject evolution is that of human origins. The scientific story of the evolution of our human ancestors is fascinating, but it also provokes the strongest resistance. My own interests, as an astrobiologist, are in microbial evolution, which is a less threatening subject. I remember a young teacher coming up to me after a lecture and saying how amazed she was that I had talked for an hour about evolution and the history of life without mentioning primate evolution or human origins. I am not suggesting that we ignore the fascinating story of homonid evolution, but I bet that there are many people who would be more receptive to evolutionary concepts if we refrained from an in-your-face challenge to their convictions about human origins or the nature of the human soul.

Another topic that is controversial is the origin of life. Creationists love to confuse origins with evolution. They frequently use criticisms of, for example, the relevance of the Miller-Urey experiment to undercut the entire concept of biological evolution. Let's not be sidetracked into the problems of the origin of life. While a great deal of research has been done to define the conditions under which life began on Earth and to understand basic biochemistry, the actual process by which living things emerged is not understood by science. I believe we can and should admit this mystery. There may be many people who will open their minds to the ideas of evolution as long as we don't claim that science has all the answers, especially about the ultimate origin of life and the meaning of being human. These topics can be explored later, when we have overcome initial emotional resistance to any form of evolution.

Above all, I hope that we can frame the evolution-creationist debate in ways that open our audience to the exciting ideas and accomplishments of science. When appropriate, we should be happy to defend teaching evolution in the context of family values and economic advantage as well as pure science. There is no reason to make this a debate about religion; we are almost sure to lose such a confrontation. But we must also understand where our audience is coming from and find ways to present the science in a non-confrontational and accessible way. □

THE INTELLIGENT DESIGNER

Irving Rothchild

Is it female or male? Does it have any sex?
Does it come with a name, like Jane, Irving, or Rex?
What we need is a super-intelligent definer
To define this uncanny Intelligent Designer!

Has it got any features? Does it have any limbs?
Is it made of dark matter or two-dimensional films?
Among all the world's gods, is it major or minor?
This amorphous, intangible Intelligent Designer!

Does it live on a planet, a star, or a comet?
Inside a black hole or far, far away from it?
Can it ride on a light beam or something diviner?
This incongruous, elusive Intelligent Designer!

Would a galactic ensemble fit most of it in,
Or is it as small as the head of a pin,
Or perhaps in between, like a grand ocean liner?
This mysterious, pretentious Intelligent Designer!

Does it get a big charge out of making malaria,
Cholera, AIDS, or a cook who's a carrier
Of typhoid or worms who love to live in your spine or
Your belly? this heartless Intelligent Designer!

Did the brain carcinoma (what's more unbenigner?)
Come out of the shop of the Intelligent Designer?
Does the tse-tse fly sing a clear thankful hosanna
To the ID every time it makes someone a goner?

Does it have any purpose except to confuse
Bible myths of creation with what scientists use
To learn how designs in nature are made?
This Intelligent Designer — a pointless charade!

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Why Scientists Get So Angry When Dealing with ID Proponents

Intelligent Design proponents are constantly quoting scientists out of context to make it wrongly appear they have grave reservations about evolution.

JASON ROSENHOUSE

I am sometimes asked why supporters of evolution get so angry when addressing proponents of Intelligent Design (ID). My answer is that if the evolution/ID dispute were simply a discussion of rival scientific claims, say about whether known evolutionary mechanisms are capable of explaining the formation of complex systems, then the discussion would be far less acrimonious. In reality, however, ID proponents spend most of their time leveling bogus charges against evolution. Professionals in the relevant fields possess the expertise to immediately recognize that the charges are scientifically untrue, but the lay audiences to which these charges are directed are unlikely to be similarly equipped. The result is that ID proponents present a picture

of modern biology that is completely unsupported scientifically and disingenuous. And this is why ID proponents are so reviled by scientists.

In this article, I will document one specific example of blatant ID duplicity. It provides a useful study of ID proponents' tactics.

One of the most prolific ID proponents is William Dembski. On April 26, 2005, he published an essay at his blog in which he addressed the charge that ID proponents present quotations inaccurately. The essay began this way:

> Unlike the serious sciences (e.g., quantum electrodynamics, which is accurate up to 14 decimal places), evolution has become an exercise in filling holes by digging others. Fortunately, the cognitive dissonance associated with this exercise can't be suppressed indefinitely, so occasionally evolutionists fess-up that some gaping hole really is there and can't be filled simply by digging another hole. Such admissions, of course, provide ready material for evolution critics like me. Indeed, it's one of the few pleasures in this business sticking it to the evolutionists when they make some particularly egregious admission. Consider the following admission by Peter Ward (Ward is a well-known expert on ammonite fossils and does not favor a ID-based view). . . .

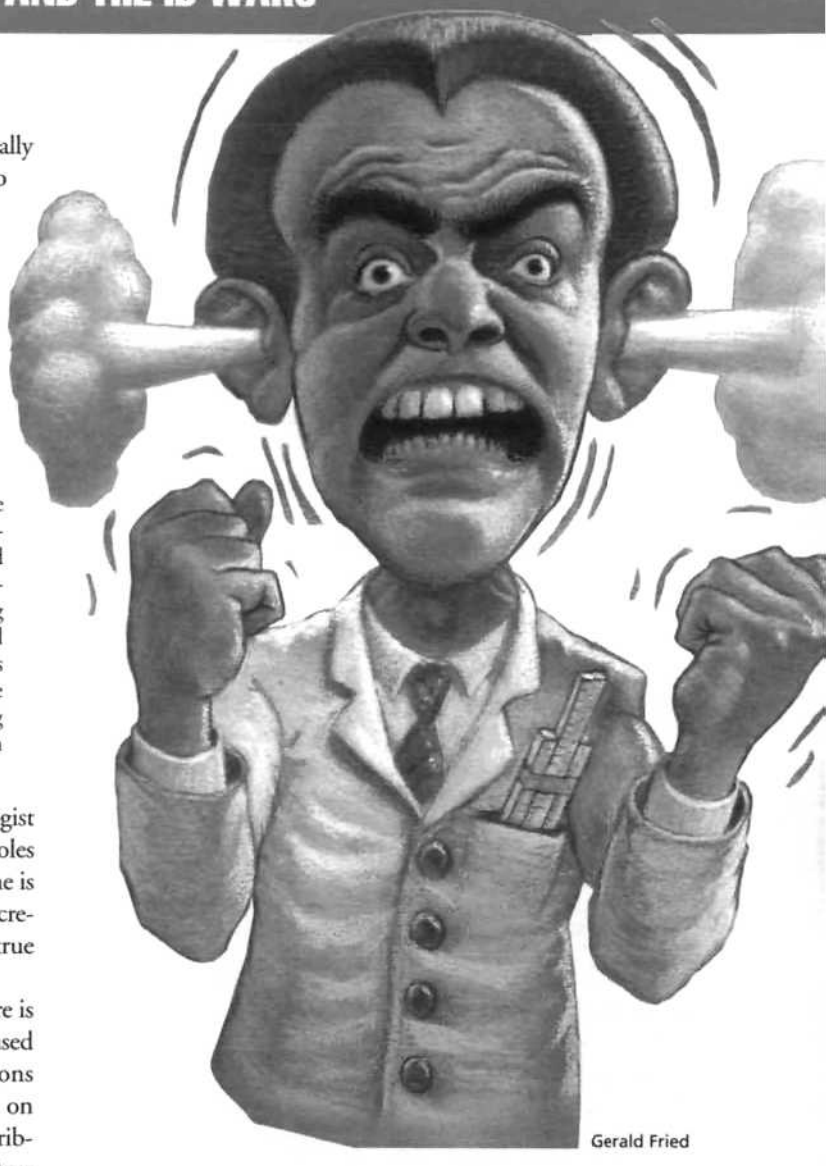
Dembski is about to present a quotation from paleontologist Peter Ward to support his contention that there are gaping holes in evolutionary biology. Dembski tells us that the quotation he is about to present is the product of the cognitive dissonance created when scientists must suppress what they know to be true about the deficiencies of evolution.

We will come to the quotation in a moment, but first there is some history to recount. As described by Dembski, he first used Ward's statement in an essay entitled "Five Questions Evolutionists Would Rather Dodge," posted at his Web site on April 14, 2004. Shortly after this essay was posted, two contributors to "The Panda's Thumb" blog, Gary Hurd and Dave Mullenix, wrote a rebuttal taking Dembski to task for, among other things, misusing Ward's statement. Dembski's blog entry, quoted above, was to be a belated reply to Hurd and Mullenix.

Prior to reading Dembski's blog entry, I had not read his "Five Questions" essay. Likewise, I had not read the reply by Hurd and Mullenix. I also had never heard of Peter Ward, had not read the book from which the quote was taken, and did not know anything about Ward's scientific opinions. Consequently, I was able to investigate the situation with no preconceived notions about who was telling me the truth. I knew that the facts of the matter would be easy enough to obtain, and that they would allow me to determine who was providing the straight story.

I began by reading Dembski's essay. The relevant statement is the following:

> The challenge that here confronts evolution is not isolated but pervasive, and comes up most flagrantly in what's called the Cambrian Explosion. In a very brief window of time during the geological period known as the Cambrian, virtually all the basic animal types appeared suddenly in the fossil record with no trace of evolutionary ancestors. The Cambrian explosion so flies in the face of evolution that paleontologist Peter Ward wrote, "If ever there was evidence suggesting Divine Creation, surely the Precambrian and Cambrian transition, known from numerous localities across the face of the earth, is it." Note that Ward is not a creationist.



Gerald Fried

Already a question emerges. Taken at face value, Ward's statement above seems to affirm the idea that the Cambrian Explosion is strong evidence for Divine Creation. If that is an accurate presentation of Ward's opinion on this subject, then why *isn't* Ward a creationist?

Ward made his statement in his 1992 book *On Methuselah's Trail.* I obtained a copy of the book, flipped to page 29, and found that Ward had indeed written the words being attributed to him. The quoted line comes at the beginning of a ten-page section entitled "The Base of the Cambrian." In this section Ward provides a brief history of what is known about the Precambrian to Cambrian transition.

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So I decided to read the rest of the section. After the line Dembski quoted, Ward goes on to describe Darwin's own concerns about the Cambrian explosion (though that term did not exist in Darwin's time). He also discusses various explanations offered by some of Darwin's contemporaries, such as Roger Murchison and Adam Sedgwick, and shows how those explanations fared in the face of subsequent discoveries.

This goes on for several pages. Eventually Ward comes to more modern views of the subject. And this is where Dembski's creative use of quotations becomes obvious. On page 35, Ward writes this:

> Until almost 1950 the absence of metazoan fossils older than Cambrian age continued to puzzle evolutionists and earth historians alike. Other than the remains of single-celled creatures and the matlike stromatolites, it did indeed look as if larger creatures had arisen with a swiftness that made a mockery of Darwin's theory of evolution. This notion was finally put to rest, however, by the discovery of the Ediacarian and Vendian fossil faunas of latest Precambrian age.

On page 36 we find:

> Intensive searching of strata immediately underlying the well-known basal Cambrian deposits in the years between 1950 and 1980 showed that the larger skeletonized fossils (such as the trilobites and brachiopods) that supposedly appeared so suddenly were in fact preceded by skeletonized forms so small as to be easily overlooked by the pioneering geologists.

And just in case there is still any doubt, Ward closes the section with the following statement:

> The long-accepted theory of the sudden appearance of skeletal metazoans at the base of the Cambrian was incorrect: the basal Cambrian boundary marked only the first appearance of relatively large skeleton-bearing forms, such as the brachipods and trilobites, rather than the first appearance of skeletonized metazoans. Darwin would have been satisfied. The fossil record bore out his conviction that the trilobites and brachipods appeared only after a long period of evolution of ancestral forms. (pp. 36–37)

From these statements it is obvious that Ward does *not* believe the Cambrian explosion is an insoluble problem for evolution. *Quite the contrary. He states clearly that recent fossil discoveries* pertaining to the Cambrian explosion have been a vindication of Darwin.

So what about that "Divine Creation" remark? In context it is *obviously a framing sentence intended to set up the ensuing discussion.* Ward was not stating his own opinion or the opinion of any particular modern paleontologist. Instead he was merely describing the way things seemed to many people prior to Darwin, and for many years after Darwin.

The next step was to read what Hurd and Mullenix had to say on this subject. They began with a lengthy discussion in which they showed that Dembski's assertions about the Cambrian explosion, quoted above, are quite false. They next discuss the Ward quote, and come to the same conclusion I did. They even used two of the same quotes that I found. They concluded by showing that after distorting Ward's clearly stated intention, Dembski went on to misrepresent a statement from Stephen Jay Gould.

Let's review. Dembski tried to imply that the non-creationist Peter Ward nonetheless agrees with Dembski's view that the Cambrian explosion is a problem for evolution. In reality, Ward's clearly stated view is that while the Cambrian explosion used to be viewed as a problem for evolution, recent fossil discoveries actually show that it is a vindication for Darwin. Hurd and Mullenix pointed this out, showing in great detail that Dembski had not only distorted Ward, but had done likewise to Gould. They also showed that Dembski's version of the facts was simply wrong. Dembski ignored what Hurd and Mullenix had said and repeated his earlier error about Ward's intentions.

And that brings us back to Dembski's blog entry. We resume the action from the point where my opening quote left off. He quotes Ward as saying:

> "The seemingly sudden appearance of skeletonized life has been one of the most perplexing puzzles of the fossil record. How is it that animals as complex as trilobites and brachipods could spring forth so suddenly, completely formed, without a trace of their ancestors in the underlying strata? If ever there was evidence suggesting Divine Creation, surely the Precambrian and Cambrian transition, known from numerous localities across the face of the earth, is it."
>
> —Peter Douglas Ward, *On Methuselah's Trail: Living Fossils and the Great Extinctions* (New York: W.H. Freeman), 1992, 29.

And goes on to say:

> Pretty convincing indicator that the Cambrian explosion poses a challenge to conventional evolutionary theory, wouldn't you say? Note that this is not a misquote: I indicate clearly that Ward does *not support ID and there's sufficient unedited material here to* make clear that he really is saying that the Cambrian explosion poses a challenge to conventional evolutionary theory.

Unlike in his original essay, Dembski now gives the entire paragraph from which the "Divine Creation" statement appeared. Even those few extra sentences are enough to make one suspect that Ward was not saying anything useful to ID folks. The phrases "seemingly" and "has been," suggest that Ward is setting up his readers for the eventual resolution to the problem.

Dembski asserts that this is not a misquote on the grounds that (a) he indicates clearly that Ward does not support ID and (b) he includes enough material here to show Ward's true intention.

Alas, (a) is totally irrelevant. At issue here is not whether Ward is an evolutionist or a creationist. Rather, the issue is what Ward thinks about the Cambrian explosion. And we have already seen that (b) is false. This paragraph by itself does not reflect Ward's intention. Ward's opinion, as stated in his book, could not have been clearer. This is not a situation where Ward intended one

thing, but because of sloppy writing could be plausibly interpreted as saying something else. Nor is this a situation where Ward believes that on balance the evidence supports evolution, but that there are certain holes nonetheless in the current theory.

This is hardly an isolated case. When I first started investigating the evolution/creationism issue I noticed that antievolutionists were constantly quoting scientists in ways that made it appear they had grave reservations about modern theory. I knew for a fact that the people being quoted were themselves passionate defenders of evolution. Initially I found it difficult to understand why these scientists would defend a theory they apparently had deep reservations about.

So I investigated dozens of cases like the one described in this essay. In every case I found that the quotation was badly out of context. Sometimes what was presented as a minor revision of an esoteric part of evolutionary theory was exaggerated into a criticism of the theory as a whole. Other times, like the situation described here, the meaning of a statement was so twisted that it was made to seem to be saying the precise opposite of the author's clearly stated intention. In every case the quotation was made to appear to mean something different from the writer's actual opinion.

This explains why scientists become so angry when dealing with this subject. If the issue were simply that mainstream science says, for example, that current theory is fully capable of accounting for information growth in the genome, while a handful of dissenters claimed otherwise, then I would be all in favor of engaging in polite debate. The reality, however, is that many ID proponents are entirely shameless in presenting the most malicious caricatures of modern science. In response to such behavior, anger is entirely appropriate.

This also explains why ID proponents rarely make any attempt to present their case to professionals. In front of such an audience their distortions would be immediately obvious. They are on far safer ground lobbying school boards and state legislatures. When making your case in front of audiences that do not know the facts of the situation, it is easier to lie with impunity.

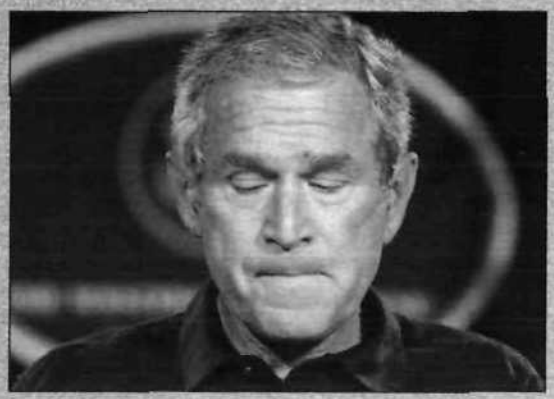
Relevant Web Sources

Dembski's April 26, 2004, blog entry is available at www.uncommondescent.com/index.php/archives/date/2005/04/26/.

His essay "Five Questions Darwinists Would Rather Dodge," is available in PDF format at www.designinference.com/documents/2004.04.Five_Questions_Ev.pdf.

The reply by Gary Hurd and Dave Mullenix to Dembski's "Five Questions" essay is available at www.pandasthumb.org/pt-archives/000251.html.

I have posted an essay at my blog in which I provide further details beyond what I included here. You can find that essay at evolutionblog.blogspot.com/2005/05/study-in-id-duplicity.html. □



AGU: President Confuses Science and Belief, Puts Schoolchildren at Risk

Editor's note: The following statement was issued by the American Geophysical Union in Washington on August 2, 2005.

"President Bush, in advocating that the concept of 'Intelligent Design' be taught alongside the theory of evolution, puts America's schoolchildren at risk," says Fred Spilhaus, Executive Director of the American Geophysical Union. "Americans will need basic understanding of science in order to participate effectively in the twenty-first-century world. It is essential that students on every level learn what science is and how scientific knowledge progresses."

In comments to journalists on August 1, the President said that "both sides ought to be properly taught." "If he meant that Intelligent Design should be given equal standing with the theory of evolution in the nation's science classrooms, then he is undermining efforts to increase the understanding of science," Spilhaus said in a statement. "'Intelligent Design' is not a scientific theory." Advocates of Intelligent Design believe that life on Earth is too complex to have evolved on its own and must therefore be the work of a designer. That is an untestable belief and, therefore, cannot qualify as a scientific theory."

"Scientific theories, like evolution, relativity, and plate tectonics, are based on hypotheses that have survived extensive testing and repeated verification," Spilhaus says. "The President has unfortunately confused the difference between science and belief. It is essential that students understand that a scientific theory is not a belief, hunch, or untested hypothesis."

"Ideas that are based on faith, including 'Intelligent Design,' operate in a different sphere and should not be confused with science. Outside the sphere of their laboratories and science classrooms, scientists and students alike may believe what they choose about the origins of life, but inside that sphere, they are bound by the scientific method," Spilhaus said.

AGU is a scientific society, comprising 43,000 earth and space scientists. It publishes a dozen peer-reviewed journal series and holds meetings at which current research is presented to the scientific community and the public.

The Pope and I

LAWRENCE M. KRAUSS

Much of my popular writing in newspapers over the past several years has been devoted to trying to clearly lay out the demarcation between science and religion in order to help fend off attacks on science by those who feel that the absence of an explicit consideration of a deity in scientific explorations implies that the scientific enterprise is itself somehow either inconsistent or immoral. Darwinian evolution is usually at the center of these attacks, because many groups feel that somehow evolution via natural selection poses a direct threat to the notion that humanity is a divine creation. Interestingly, the attacks are, however, often couched in seemingly scientific language and the claim is made that evolution is simply bad science.

Most recently, in perhaps the most conciliatory piece I have ever written, I described in a May opinion piece in *The New York Times* ("School Board Wants to 'Teach the Controversy.' What Controversy?" May 17, 2005) how recent statements made by Pope John Paul II, and by the International Theological Commission, have made it clear that the Catholic Church can theologically accept natural selection mediated by unguided genetic mutation, because they view God to be the "cause of all causes." Therefore, God can act through natural physical processes to achieve the desired goal, presumably the existence on Earth of human beings.

More importantly, I felt, I used the example of Georges Lemâitre, the Belgian priest who, as a theoretical physicist, first discovered the Big Bang solution of Einstein's equations from General Relativity. While the discovery of a consistent expanding universe stood the then-conventional scientific wisdom on its head (implying a finite age for what had previously been assumed to have been an eternal universe), Lemâitre nevertheless worked hard to convince Pope Pius XII to cease proclaiming a new scientific basis for Genesis. As he indicated, the Big Bang theory—as it later became known—was a scientific theory that made falsifiable predictions. Whatever metaphysical implications one chooses to draw from the theory are essentially independent of the science itself.

As a result, I argued that the current supposed "controversy" over the teaching of evolution in high schools in this country was not a scientific controversy at all, but a theological one. Just as the Big Bang neither proved nor disproved the existence of God, so too evolution as a natural process is equally independent of one's theological leanings. The absence of explicit evidence for design, which in fact appears to be the case, is no more a proof that God doesn't exist than the Big Bang implies that the biblical story of Genesis is accurate.

Imagine my surprise when almost eight weeks after the appearance of my piece in the *Times*, an op-ed ("Finding Design in Nature," July 7) was published in the *Times* by Cardinal Christoph Schönborn, the Archbishop of Vienna, that appeared to take issue with my claims and moreover indicated that unless science manifestly recognized the "overwhelming" evidence for design in nature, it could not be consistent with Catholic theology.

I subsequently discovered from a *New York Times* news article ("Leading Cardinal Redefines Church's View on Evolution," July 9) that the Cardinal apparently became aware of my piece through interactions with the Washington Bureau director of the Discovery Institute, the major Intelligent Design lobbying organization in this country, and moreover, that the public relations firm for the Discovery Institute actually submitted his piece.

Motivated by this, I took the opportunity to write an open letter to the new Pope (Benedict XVI) (July 12), cosigned by two distinguished Catholic biologists, Kenneth Miller and Francisco Alaya, asking the Holy Father to clarify and reconfirm the Church's support for evolution via natural selection as a "contingent" process governed solely by natural physical laws. *The New York Times* picked up the story, and it has circulated around the country.

I took the opportunity to write an open letter to the new Pope . . . asking the Holy Father to clarify and reconfirm the Church's support for evolution via natural selection as a "contingent" process. . . .

A number of scientists have written to me asking why I have bothered to try to influence the Catholic Church in this regard. After all, with its doctrinal belief in virginal birth, opposition to stem-cell research, etc., the Church is not generally viewed as a particularly progressive scientific organization.

This is in fact largely the reason to be particularly concerned about these recent developments, however. As long as Catholic theology is understood as being consistent with scientific investigation in general, and with evolutionary biology in particular, the claims of various fundamentalist groups in this country that one must be an atheist to accept that natural selection has resulted in the diverse evolution of life on Earth can be demonstrated to be vacuous. If Cardinal Schönborn's flawed theology is left to stand without comment, the efforts of all those who wish to help fight the public relations battle against false controversy now being waged in various school districts throughout the country will be severely hampered.

Whether or not one is particularly religious, most people in this country are. Anyone interested in education must understand that to effectively convey ideas, you must be willing to reach out to understand where those you're trying to teach are coming from. I believe that those who feel they must first attack the basic premises of religious orthodoxy in the process of explaining the nature of science are acting inappropriately. Science and religion are separate aspects of the human experience. Scientists who convey the impression that the scientific experience has exclusive ownership on truth only serve to further alienate the vast majority of religious non-fundamentalists to whom one might hope to expose the beauty and the power of the scientific process. □

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Endless Forms Most Beautiful

A New Revolution in Biology

Over the past two decades, a new revolution has unfolded in biology. Advances in embryology and evolutionary development biology (dubbed Evo Devo)—involving genetic switches and simple rules that shape animal form and evolution—have profoundly reshaped our picture of how evolution works.

SEAN B. CARROLL

An excerpt from
Endless Forms Most Beautiful: The New Science of Evo Devo.

The great variety in the size, shape, organization, and color of animal bodies raises deep questions about the origins of animal forms. How are individual forms generated? And, how have such diverse forms evolved? These are very old questions in biology that date back to Darwin's time and before, but only very recently have deep answers been discovered, many of them so surprising and profound that they have revolutionized our views on the making of the animal world and our place in it. We all share an attraction to animal form, but my aim is to expand that

wonder and fascination to how form is created, that is, to our new understanding of the biological processes that generate pattern and diversity in animal design.

While Darwin, Huxley, and their allies knew that embryological development was key to evolution, for more than one hundred years after their chief works, virtually no progress was made in understanding the mysteries of development. The puzzle of how a simple egg gives rise to a complete individual stood as one of the most elusive questions in all of biology. Many thought that development was hopelessly complex, and would involve entirely different explanations for different types of animals. So frustrating was the enterprise, that the study of embryology, heredity, and evolution, once intertwined at the core of biological thought a century ago, fractured into separate fields as each sought to define its own principles.

Because embryology was stalled for so long, it played no part in the so-called "Modern Synthesis" of evolutionary thought that emerged in the 1930s and 1940s. In the decades after Darwin, biologists struggled to understand the mechanisms of evolution. At the time of *The Origin of Species* (1859), the mechanism for the inheritance of traits was not known. Mendel' s work was rediscovered decades later and genetics did not prosper until well into the 1900s. Different kinds of biologists were approaching evolution at dramatically different scales. Paleontology focused on the largest time scales, the fossil record, and the evolution of higher taxa. Systematists were concerned with the nature of species and the process of speciation. Geneticists generally studied variation in traits in just a few species. These disciplines were disconnected and sometimes hostile over which offered the most worthwhile insights into evolutionary biology. Harmony was gradually approached through an integration of evolutionary viewpoints at different levels. Julian Huxley's book *Evolution: The Modern Synthesis* (1942) signaled this union and the general acceptance of two main ideas. First, that gradual evolution can be explained by small genetic changes that produce variation which is acted upon by natural selection. And second, that evolution at higher taxonomic levels and of greater magnitude can be explained by these same gradual evolutionary processes sustained over larger periods.

The Modern Synthesis established much of the foundation for how evolutionary biology has been discussed and taught for the past sixty years. However, despite the monikers of "Modern" and "Synthesis," it was incomplete. At that time, we could say that forms do change, and that natural selection is a force, but we could say nothing about *how* forms change, about the visible drama of evolution as depicted, for example, in the fossil record. The Synthesis treated embryology as a "black box" that somehow transformed genetic information into three-dimensional, functional animals.

The stalemate continued for several decades. Embryology was preoccupied with phenomena that could be studied by manipulating the eggs and embryos of a few species, and the evolutionary framework faded from embryology's view. Evolutionary biology was studying genetic variation in populations, ignorant of the relationship between genes and form. Perhaps even worse, the perception of evolutionary biology in some circles was that it had become relegated to dusty museums.

Such was the setting in the 1970s when voices for the reunion of embryology and evolutionary biology made themselves heard. Most notable was Stephen Jay Gould, whose book *Ontogeny and Phylogeny* revived discussion of the ways in which the modification of development may influence evolution. Gould had also stirred up evolutionary biology when, with Niles Eldredge, he took a fresh look at the patterns of the fossil record and forwarded the idea of "punctuated equilibrium"—that evolution was marked by long periods of stasis (equilibrium) interrupted by brief intervals of rapid change (punctuation). Gould's book and his many subsequent writings reexamined the "Big Picture" in evolutionary biology and underscored the major questions that remained unsolved. He planted seeds in more than a few impressionable young scientists, myself included.

To me, and others who had been weaned on the emerging successes of molecular biology in explaining how genes work, the situations in embryology and in evolutionary biology were both unsatisfying states of affairs, and enormous potential opportunities. Our lack of embryological knowledge seemed to make much of the discussion in evolutionary biology about the evolution of form just futile exercises in speculation. How could we make progress on questions involving the evolution of form without a scientific understanding of how form is generated in the first place? Population genetics had succeeded in establishing the principle that evolution is due to changes in genes, but this was a principle without an example. No gene that affected the form and evolution of any animal had been characterized. New insights in evolution would require breakthroughs in embryology.

The Evo-Devo Revolution

Everyone knew that genes must be at the center of the mysteries of both development and evolution. Zebras look like zebras, butterflies look like butterflies, and we look like we do because of the genes we carry. The problem was that there were no, or very few, clues as to which genes mattered for the development of any animal.

The long drought in embryology was eventually broken by a few brilliant geneticists who, while working with the fruit fly, the

Sean B. Carroll is an investigator at the Howard Hughes Medical Institute and a professor of genetics at the University of Wisconsin–Madison. He is one of the leading biologists of his generation, and his seminal discoveries have been featured in many popular publications. This article is excerpted by permission from his new book Endless Forms Most Beautiful: The New Science of Evo Devo *(W.W. Norton, New York, 2005). E-mail: sbcarroll@wisc.edu.*

workhorse of genetics for the past eighty years, devised schemes to find the genes that controlled fly development. The discovery of these genes and their study in the 1980s gave birth to an exciting new vista on development, and revealed a logic and order underlying the generation of animal form.

Almost immediately after the first sets of fruit fly genes were characterized came a bombshell that triggered a new revolution in evolutionary biology. For more than a century, biologists had assumed that different types of animals were genetically constructed in completely different ways. The greater the disparity in animal form, the less (if anything) the development of two animals would have in common at the level of their genes. One of the architects of the Modern Synthesis, Ernst Mayr, had written that "the search for homologous [the same] genes is quite futile except in very close relatives." But contrary to the expectations of *any* biologist, most of the genes first identified as governing major aspects of fruit fly body organization were found to have exact counterparts that did the same thing in most animals, including ourselves. This discovery was followed by the revelation that the development of various body parts such as eyes, limbs, and hearts, vastly different in structure among animals and long thought to have evolved in entirely different ways, were also governed by the same genes in different animals. The comparison of developmental genes between species became a new discipline at the interface of embryology and evolutionary biology—evolutionary developmental biology or "Evo-Devo" for short.

The first shots in the Evo-Devo revolution revealed that despite their great differences in appearance and physiology, all complex animals—flies and fly catchers, dinosaurs and trilobites, butterflies and zebras and humans—all share a common "toolkit" of "master" genes that govern the formation and patterning of their bodies and body parts. The important point to appreciate is that its discovery shattered our previous notions of animal relationships and of what made animals different, and opened up a whole new way of looking at evolution.

We now know from sequencing the entire DNA of species (their "genomes") that not only do flies and humans share a large cohort of developmental genes, but that mice and humans have virtually identical sets of about 25,000 genes, and that chimps and humans are nearly 99 percent identical at the DNA level. These facts and figures should be humbling to those who wish to hold humans above the animal world and not an evolved part of it. I wish the view I heard expressed by Lewis Black, the stand-up comedian, was more widely shared. He said he won't even debate evolution's detractors because "We've got the fossils. We win." Well put, Mr. Black, but there is far more to rely on than just fossils.

Indeed, the new facts and insights from embryology and Evo-Devo devastate lingering remnants of stale anti-evolution rhetoric about the utility of intermediate forms or the probability of evolving complex structures. We now understand how complexity is constructed from a single cell into a whole animal. And we can see, with an entirely new set of powerful methods, how modifications of development increase complexity and expand diversity. The discovery of the ancient genetic toolkit is irrefutable evidence of the descent and modification of animals, including humans, from a simple common ancestor. Evo-Devo can trace the modifications of structures through vast periods of evolutionary time—to *see* how fish fins were modified into limbs in terrestrial vertebrates, how successive rounds of innovation and modification crafted mouthparts, poison claws, swimming and feeding appendages, gills, and wings from a simple tube-like walking leg, and how many kinds of eyes have been constructed beginning with a collection of photosensitive cells. The wealth of new data from Evo-Devo paints a vivid picture of how animal forms are made and evolve.

The Toolkit Paradox and the Origins of Diversity

The stories of shared body-building genes and of the similarities of our genome to that of other animals have slowly been gaining

Evo Devo: A Revolutionary Quartet

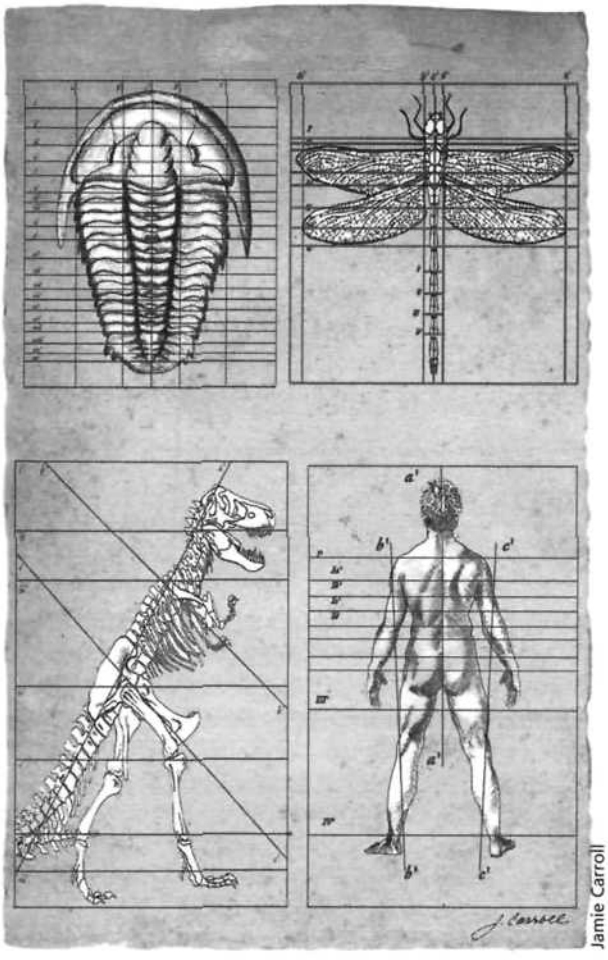
The impact and importance of Evo Devo emerges from four points:

First, Evo Devo constitutes a third major act in a continuing evolutionary synthesis. Evo Devo has not just provided a critical missing piece of the "Modern Synthesis"—embryology—and integrated it with molecular genetics and traditional elements such as paleontology. The wholly unexpected nature of some of its key discoveries and the unprecedented quality and depth of evidence it has provided towards settling previously unresolved questions bestow it with a revolutionary character.

Second, Evo Devo provides a new means of teaching evolutionary principles in a more effective framework. By focusing on the drama of the evolution of form, and illustrating how changes in development and genes are the basis of evolution, the deep principles underlying the unity and diversity of life emerge. Furthermore, the visible forms of gene expression patterns in embryos and the concrete inventories of toolkit gene sets in different species provide more effective ways of illustrating evolutionary concepts than previous, more abstract approaches.

Third, because Evo Devo reveals and illustrates the evolutionary process and principles in such tangible ways, it has a critical role to play in the forefront of the societal struggle over the teaching of evolutionary biology.

And finally, the importance of evolutionary biology is far more than mere philosophy. The fate of the endless forms of nature, including humans, depends on a broader understanding of humans' impacts on evolution.



Jamie Carroll

in public awareness. What is generally neglected, however, is how the discovery of this common toolkit and of great similarities among different species' genomes presents an apparent paradox. If the sets of genes are so widely shared, how do differences arise? The resolution of this paradox and its implications are central to my story. The paradox of great genetic similarity among diverse species is resolved by two key ideas. These concepts are crucial for understanding how the species-specific instructions for building an animal are encoded in its DNA and how form is generated and evolves. The substance of these ideas has received scant, if any, attention in the general press, but they have profound implications for understanding great episodes in life's history such as the explosion of animal forms during the Cambrian period, the evolution of diversity within groups such as butterflies or beetles or finches, and our evolution from a common ancestor with chimps and gorillas.

The first idea is that diversity is not so much a matter of the complement of genes in an animal's toolkit, but in the words of Eric Clapton, "It's in the way that you use it." The development of form depends upon the turning on and off of genes at different times and places in the course of development. Differences in form arise from evolutionary changes in where and when genes are used, especially those genes that affect the number, shape, or size of a structure. There are many ways to change how genes are used and that this has created tremendous variety in body designs and the patterning of individual structures.

The second idea concerns where in the genome the "smoking guns" for the evolution in form are found. It turns out that it is not where we have been spending most of our time for the past forty years. It has long been understood that genes are made up of long stretches of DNA that are decoded by a universal process to produce proteins, which do the actual work in animal cells and bodies. The genetic code for proteins, a twenty-word vocabulary, has been known for forty years and it is easy for us to decode DNA sequences into protein sequences. What is much less appreciated is that only a tiny fraction of our DNA, just about 1.5 percent, codes for the roughly 25,000 proteins in our bodies. So what else is there in the vast amount of our DNA? Around 3 percent of it, made up of about one hundred million individual bits, is *regulatory*. This DNA determines when, where, and how much of a gene's product is made. Regulatory DNA is organized into fantastic little devices that integrate information about position in the embryo and the time of development. The output of these devices is ultimately transformed into pieces of anatomy that make up animal forms. This regulatory DNA contains the instructions for building anatomy, and evolutionary changes within this regulatory DNA lead to the diversity of form.

The Grandeur in a More Modern Synthesis: Act III

The continuing story of evolution may be thought of as a drama in at least three acts. In Act I, almost 150 years ago, Darwin closed the most important book in the history of biology by urging his readers to see the grandeur in his new vision of nature [see box]. In Act II, the architects of the Modern Synthesis unified at least three disciplines to forge a grand synthesis. Here in Act III, there is also a special grandeur in the view embryology and evolutionary developmental biology provide into the making of animal form and diversity. Part of it is visual, in that we can now see how the forms of different animals actually take shape.

But beauty, in science, is much more than skin deep. The best science is an integrated product of our emotional and intellectual sides, a synthesis between what is often referred to as our "left" brain (reasoning) and "right" brain (emotional/artistic) hemispheres. The greatest "eurekas" in science combine both sensual aesthetics and conceptual insight. The physicist Victor Weisskopf noted, "What is beautiful in science is the same thing that is beautiful in Beethoven. There's a fog of events and suddenly you see a connection. It expresses a complex of human concerns that goes deeply to you, that connects things that were always in you that were never put together before."

Those connections are revealing some simple, elegant truths that deepen our understanding of all animal forms, including ourselves, and should transform how evolutionary science is taught and accepted.

Evo Devo and the Teaching of Evolution

The teaching of evolution faces two challenges. The first is that it is a vast and growing subject that encompasses many disciplines.

The second is that it is actively opposed, particularly in the U.S., by some (but not all!) religious factions. I will address the new contribution Evo Devo can make to improving general public understanding first, the issue of opposition later.

In general, the public understanding of evolution in the United States is particularly abominable. In a survey of citizens in twenty-one countries regarding general environmental and scientific knowledge, the U.S. placed dead last on the question of human evolution. Looking at the bright side, the U.S.A. can only move up from here.

In another survey, by the National Science Board in 1996, 52 percent of Americans polled either agreed with (32 percent) or did not know (20 percent) whether the statement "The earliest humans lived at the same time as the dinosaurs" was true or not.

Score that fact as two points for *The Flintstones*, zero for Darwin, Huxley, and the educational system of the world's most wealthy, powerful, and technologically driven nation.

The scandal of this ignorance is on par, I would say, with not knowing how the U.S.A. was formed, the content of its Constitution, or the roots of Western civilization. This knowledge is considered basic literacy and taught and repeated at many grade levels. So, too, is biology and earth science for which evolution must provide the basic framework. Yet, the statistics are appalling.

The situation is bad enough, and reflected in other figures about science and math literacy, that the blame can probably be shared in many quarters. There are plenty of books written about and organizations studying the general problem of scientific illiteracy and its causes. I won't get into finger pointing here. The only way up is through education. I would rather focus on what biologists and their allies at all levels of the teaching profession can do to improve matters, particularly in regard to evolution.

First, we must insist that evolution is much more than just a topic in biology, it is the foundation of the entire discipline. Biology without evolution is like physics without gravity. Just as we cannot explain the structure of the universe, the orbits of the planets and moon, or tides from mere measurement, we cannot explain human biology or Earth's biodiversity via a compendium of thousands of little facts. All general survey courses and texts must have evolution as their central unifying theme.

With respect to the scientific content to be taught, Evo Devo has much to contribute that is new, tangible, and convincing. Since the Modern Synthesis, most expositions of the evolutionary process have focused on microevolutionary mechanisms. Millions of biology students have been taught the view (from population genetics) that "evolution is change in gene frequencies." Isn't that an inspiring theme? This view forces the explanation toward mathematics and abstract descriptions of genes, and away from butterflies and zebras, or Australopithecines and Neanderthals.

The evolution of form is the main drama of life's story, both as found in the fossil record and in the diversity of living species. So, let's teach that story. Instead of "change in gene frequencies," let's try "evolution of form is change in development." This is, of course, a throwback to the Darwin-Huxley era, when embryology played a central role in the development of all evolutionary thought. The advantages of an embryological approach to teaching evolution are several-fold.

First, it is a small leap to go from the building of complexity in one generation from egg to adult to appreciating how increments of change in the process, assimilated over greater time periods, produce increasingly diverse forms.

Second, we now have a very firm grasp of how development is controlled. We can explain how toolkit proteins shape form, that toolkit genes are shared by all animals, and that differences in form arise from changing the way they are used. The principle of descent by modification (of development) is crystal clear.

Third, an enormous practical advantage is the visual nature of the Evo Devo perspective. The Chinese proverb that "hearing about something a hundred times is not as good as seeing it once" is sound educational doctrine. We learn more by combining visuals with text. Let's show students embryos and how stripes, spots, and all the glorious features of animal forms are made. The evolutionary concepts follow naturally.

A fourth benefit of this approach is that it brings genetics much closer to the powerful evidence of paleontology. Dinosaurs and trilobites are the poster children of evolution that inspire the vast majority of those who touch them. By placing these wonders of the ancient past in a continuum from the Cambrian to the present life's, history is made much more tangible. It would indeed be a wonderful world if every student had guided, repeated classroom contact with some fossils.

Let me offer a couple more general suggestions. Natural selection is often at best described as a "just-so story" of adaptations. Finches beaks changed due to the type of food available, moths got darker because of pollution, etc. But I do not think that the power of small increments of selection, compounded over hundreds or thousands of generations, is widely taught or understood. The commonly repeated phrase "survival of the fittest" connotes more of a gladiator contest than the subtle power of selection to act on very small differences in overall survival and fecundity. The spread of favorable mutations in populations is easily simulated and illustrated, and it underscores the time dimension of evolution.

Finally, at the university level, the evolutionary view of life should be as fundamental to a college degree as Psychology 101 or Western Civilization. But rather than asking students to memorize and regurgitate mountains of testable facts, we should emphasize study of the history of the discovery of evolution, its major characters and ideas, and the basic lines of evidence. This would do far more to inform citizens and prepare teachers than forcing students to remember the Latin names of species. We are stoning our children to utter boredom with little pebbles and missing the big picture. The drama of the story of evolution will recapture student interest.

There is, especially in the U.S.A., another obstacle besides content and teaching methods to evolutionary literacy. I will address that next. But, even without the active opposition, we can do better, and we have to do better.

Evo Devo and the Evolution/Creation Struggle

In the short time between the first and second edition of *The Origin of Species*, Darwin inserted three more words into that famous closing paragraph, adding "by the Creator" to rewrite the phrase as "having been originally breathed by the Creator into a few forms or into one . . . ." Darwin later expressed his regret for doing so in a letter to botanist J.D. Hooker:

> But I have long regretted that I truckled to public opinion, and used the Pentateuchal term of creation, by which I really meant "appeared" by some wholly unknown process.

The insertion of these words was intended to appease critics and make Darwin's evolutionary ideas more palatable. It has certainly served to fuel much speculation about Darwin's actual religious views. For some, this olive branch and Darwin's reticence in disclosing his beliefs (which are only revealed to some degree in private correspondence and unpublished notebooks) were the foundation for reconciling and accommodating evolution and religion.

Plenty of scientists and a broad spectrum of religious denominations have found such an accommodation. For example, in 1996, Pope John Paul II reiterated the Catholic position that the human body has evolved according to natural processes. But while some denominations have explicitly accepted the reality of biological evolution, fundamentalists who insist upon a literal reading of the Bible (referred to as "Creationists") and proponents of "stealth" Creationist ideas such as Intelligent Design remain firmly opposed to evolutionary science and actively promote legislation aimed at crippling the teaching of evolution in public schools.

Goethe said that "Nothing is worse than active ignorance," and it is the agenda of these lost souls that the scientific and educational communities must thwart. I want to be very clear here in my position. I believe that the teaching of evolution and science are best served by promoting the scientific method and scientific knowledge and not by attacking religious views. The latter is a futile, counterproductive battle. However, I also believe, as many denominations have also concluded, that religion is better served by promoting and evolving their respective teachings and theologies, and not by attacking science, which is definitely a losing strategy.

Charles Harper, executive director of the John Templeton Foundation, an organization interested in the relationship between theology and science, wrote recently in the leading science journal *Nature* that:

> As scientific knowledge grows, religious commitments predicated on "gaps" in scientific understanding will invariably shrink as those gaps are closed. Those Christians who are currently fighting evolutionary science will eventually need to take it seriously.

Harper is right. In this time of unprecedented power in understanding embryos, genes, and genomes, and with the continual expansion of the fossil record, those gaps are fast disappearing.

One example of a mistaken faith in those gaps is that of biochemist Michael Behe who in 1996 published *Darwin's Black Box: The Biochemical Challenge to Evolution.* As a credentialed scientist, Behe's book was received as a godsend by creationists and is perhaps the best known treatment of Intelligent Design. But Behe's main claim, that the living cell is an entity of irreducible complexity, is empty. Behe was counting on biology to hit a wall in reducing complex phenomena to molecular processes. He joins a long line of prognosticators whose pessimistic forecasts have been obliterated in the continuing revolution in the life sciences.

Scott Gilbert, a biologist at Swarthmore College, author of the leading college text of developmental biology, and accomplished historian of embryology and evolutionary biology, has summarized the Behe position, and its failure as follows:

> To creationists, the synthesis of evolution and genetics cannot explain how some fish became amphibians, how some reptiles became mammals, or how some apes became human. . . . Behe named this inability to explain the creation of new taxa through genetics "Darwin's black box." When the box is opened, he expects evidence of the Deity to be found. However, inside Darwin's black box resides merely another type of genetics—developmental genetics.

Developmental genetics has been shedding new light on the making of complexity and the evolution of diversity for twenty years. Creationists just plain refuse to see it. How is such overt evidence ignored or dismissed? I can't pretend to understand the psychological mechanisms that allow humans to deny reality. But I do understand the desperate political and rhetorical tactics of those who, holding a losing hand, refuse to accept it.

As exasperating as the continuous battle with creationists may seem, the scientific community is now better organized and more prepared to deal with the movement. But the battle against ignorance is not won. □

A Grandeur . . . and Endless Forms Most Beautiful

Darwin closed the first edition of *The Origin of Species* with what has become perhaps the most widely quoted passage in all of biology:

> There is a grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one: and that whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.

I have chosen four words that remained completely untouched throughout all versions and editions, "endless forms most beautiful," as the inspiration for and theme of this article. This phrase resonates most perfectly with the theme of my book and captures the essence of the new science of Evo Devo.

Obfuscating Biological Evolution

ELIE A. SHNEOUR

On May 5, 1925, biology teacher John T. Scopes was arrested in Tennessee for the crime of teaching Darwin's "theory of evolution." Although the word *evolution* dates back in the English language to 1647 in another connotation, it does not appear even once in naturalist Charles Darwin's (1809–1882) landmark publication, *On the Origin of the Species by Means of Natural Selection*, which he published in 1859. The book primarily reports and brilliantly analyses Darwin's meticulous observations of finch-beak variety in the Galapagos archipelago compared to those birds on the adjacent South American mainland.

In his momentous conclusions, Darwin does not breathe a single word to assert that humans are descended from

monkeys, although he proposes a still wrongly misconstrued idea of common descent. Darwin's immense and provocative contribution to biology was about natural selection and not about how new species come to be. Natural selection is only one of several mechanisms by which evolution takes place. Individual organisms do not evolve; populations do.

How new species arise was not worked out until well into the twentieth century, primarily by geneticist Theodosius Dobzhansky (1900–1975) and biologist Ernst Mayr (1904–2005). It is Dobzhansky who famously said, "Nothing in biology makes sense except in the light of evolution." By that time, the theory of evolution was firmly established through one confirming discovery after another, in every single biological discipline from anthropology, through molecular biology and paleontology (filling in the "missing" intermediate forms of life, for example), to zoology.

There is always a wealth of creative arguments among scientists about technical details to be resolved, but the basic framework of evolution is the cornerstone of modern biology. It is as solidly based as the heliocentric theory of our planetary universe, because there exists no meaningful falsifiable evidence to contradict it. If the theory of evolution turns out to be wrong, a very unlikely proposition, it could only be replaced by another and better scientific theory—not by spurious special pleadings for which no scientific evidence exists.

Opposition is not limited to biological evolution. There are still people at the Flat Earth Society, for example, who seriously insist on religious grounds that the world is flat and that Earth is the center of the universe.

Misunderstanding of biological evolution is widespread. *Evolution*, for example, is not synonymous with *progress*. Populations can and do retrogress. Evolution has nothing directly to do with the issue of the origins of life. That is an altogether different subject. Human beings did not "descend" from apes, but the two creatures do share a common ancestor. In the simplest terms, evolution is about changes taking place in populations of living organisms as a function of time and environment.

It is difficult to understand why this subject, authoritatively studied for over 150 years, elicits so much mindless controversy. The mainly religious hostility to the theory of evolution is as fierce today as was the opposition to Copernicus and Galileo's heliocentric theory (that the sun and not Earth is at the center of our planetary system) centuries ago. The Roman Catholic Church finally accepted the heliocentric theory late in the last century, some 350 tortuous years after it was promulgated.

The attempt to inculcate "creation science" in Louisiana public schools was rejected by the U.S. Supreme Court as religious dogma rather than science, in the case of *Edwards v. Aguillard* in 1986. So now, the creationists have brazenly come back with a renewed stab at teaching "creation science" under the guise of Intelligent Design as part of the science curriculum.

John Scopes, a high-school science teacher in Dayton, Tennessee, was arrested for teaching evolution.

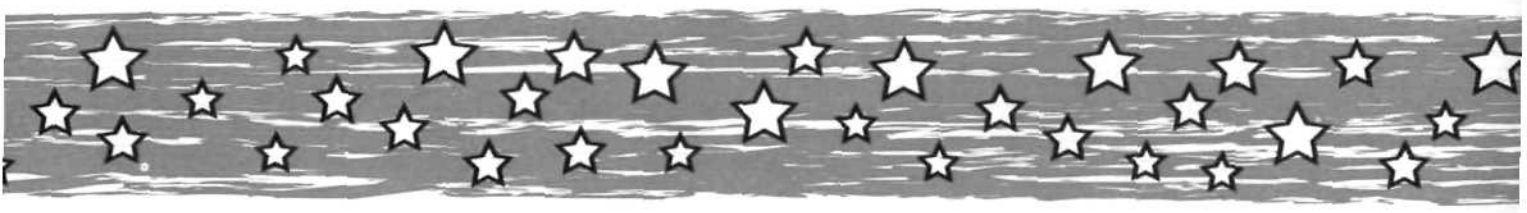
The idea of Intelligent Design is that living organisms in general and human beings in particular are so complex that they could not possibly have emerged by way of a purposeless, clueless, mechanical route. But this is exactly what actually has been happening in real life, and the mechanisms for this astonishing process are already understood in extraordinary detail. Science is certainly one of the most ethical of all human endeavors, as it emerges from a profound respect for the marvelous world that scientists are continuously discovering anew. □

Elie A. Shneour is Research Director and President of the Biosystems Research Institute in San Diego. He is a biophysicist whose work includes intermediary metabolism. He was part of the National Academy of Sciences team that generated the first search for life on Mars (the Viking missions) and has served on many other national advisory panels on scientific matters. He is a CSICOP Fellow.

Harris Poll Explores Beliefs about Evolution, Creationism, and Intelligent Design

There is an enormous gap between the firmness of the scientific evidence for evolution and the American public's beliefs about it. If that hadn't already been apparent, a Harris Poll in June 2005 put some cold, hard numbers on it. These are some of the results of the nationwide poll of 1,000 U.S. adults surveyed by telephone by Harris Interactive® between June 17 and 21, 2005.

While many in the scientific community may question why the issue of creationism and the teaching of evolution in the schools has been repeatedly raised in recent years, a new national survey shows that almost two thirds of U.S. adults (64 percent) agree with the basic tenet of creationism, that "human beings were created directly by God."



At the same time, approximately one fifth (22 percent) of adults believe "human beings evolved from earlier species" (evolution) and 10 percent subscribe to the theory that "human beings are so complex that they required a powerful force or intelligent being to help create them" (Intelligent Design). Moreover, a majority (55 percent) believes that all three of these theories should be taught in public schools, while 23 percent support teaching creationism only, 12 percent evolution only, and four percent Intelligent Design only.

Other key findings include:

- A majority of U.S. adults (54 percent) does not think human beings developed from earlier species, up from 46 percent in 1994.
- 49 percent of adults believe plants and animals have evolved from some other species, while 45 percent do not believe that.
- Adults are evenly divided about whether or not apes and man have a common ancestry (46 percent believe we do and 47 percent believe we do not).
- Again divided, 46 percent of adults agree that "Darwin's theory of evolution is proven by fossil discoveries," while 48 percent disagree.

Factors such as age, education, political outlook, and region appear to guide views on this debate.

- In general, older adults (those 55 years of age and older), adults without a college degree, Republicans, conservatives, and Southerners were more likely to embrace the creationism positions in the questions asked.
- Those with college educations, Democrats, independents, liberals, adults aged 18 to 54, and those from the Northeast and West support the belief in evolution in larger numbers. However, even among these groups, majorities believe in creationism.
- Despite the significant numbers who believe in creationism, pluralities among the demographic subgroups examined still believe that all three concepts (evolution, creationism, and Intelligent Design) should be taught in public schools.

These statements conform to the principles of disclosure of the National Council on Public Polls.

From the Harris Poll® #52, July 6, 2005.

TABLE 1

DID HUMANS DEVELOP FROM EARLIER SPECIES?
"Do you think human beings developed from earlier species or not?"

Base: All Adults

	March 1994 %	June 2005 %
Yes, I think human beings developed from earlier species.	44	38
No, I do not think human beings developed from earlier species.	46	54
Not sure/Decline to answer	11	8

Note: Percentages may not add up exactly to 100% due to rounding.

TABLE 2

PLANT AND ANIMAL DEVELOPMENT FROM OTHER SPECIES
"Do you believe all plants and animals have evolved from other species or not?"

Base: All Adults

	June 2005 %
Yes, I believe plants and animals have evolved from some other species.	49
No, I do not believe plants and animals have evolved from some other species.	45
Not sure/Decline to answer	7

Note: Percentages may not add up exactly to 100% due to rounding.

TABLE 3
DO MAN AND APES HAVE COMMON ANCESTRY?
"Do you believe apes and man have a common ancestry or not?"

Base: All Adults

	July 1996 %	June 2005 %
Yes, apes and man do have a common ancestry.	51	46
No, apes and man do not have a common ancestry.	43	47
Not sure/Decline to answer	5	7

Note: Percentages may not add up exactly to 100% due to rounding.

TABLE 4
DARWIN'S THEORY OF EVOLUTION PROVEN BY FOSSIL DISCOVERIES?

"Please tell me whether you agree or disagree with the following statement: Darwin's theory of evolution is proven by fossil discoveries."

Base: All Adults

	January 2004 %	June 2005 %
Agree (Net)	43	46
Strongly agree	19	15
Somewhat agree	24	30
Disagree (Net)	51	48
Somewhat disagree	16	19
Strongly disagree	35	29
Not Sure/Decline to answer	6	6

TABLE 5
WHERE HUMANS COME FROM
"*Which of the following do you believe about how human beings came to be?*"

Base: All Adults

	June 2005 %
Human beings evolved from earlier species.	22
Human beings were created directly by God.	64
Human beings are so complex that they required a powerful force or intelligent being to help create them.	10
Not sure/Decline to answer	4

TABLE 6
EVOLUTION IN THE CLASSROOM
"Regardless of what you may personally believe, which of these do you believe should be taught in public schools?"

Base: All Adults

	June 2005 %
Evolution only: "Evolution says that human beings evolved from earlier stages of animals."	12
Creationism only: "Creationism says that human beings were created directly by God."	23
Intelligent Design only: "Intelligent Design says that human beings are so complex that they required a powerful force or intelligent being to help create them."	4
All three	55
Neither	3
Not sure/Decline to answer	3

TABLE 7
SUMMARY OF KEY QUESTIONS ABOUT HUMAN EVOLUTION—BY EDUCATION

Base: All Adults

		Education			
	All Adults (n=1,000) %	*H.S.* or Less (n=407) %	*Some* College (n=339) %	*College* Grad (n=157) %	*Post* Grad (n=75) %
HUMAN DEVELOPMENT FROM EARLIER SPECIES					
Yes	38	32	35	46	60
No	54	59	56	46	33
PLANT AND ANIMAL DEVELOPMENT					
Yes	49	44	48	55	65
No	45	48	45	39	32
MAN AND APES HAVE COMMON ANCESTRY					
Yes	46	46	41	53	57
No	47	47	50	39	40
THEORY OF EVOLUTION PROVEN BY FOSSIL EVIDENCE					
Yes	46	40	44	55	64
No	48	51	51	39	34
HUMAN EVOLUTION					
Belief in evolution	22	17	21	31	35
Belief in creationism	64	73	66	48	42
Belief in ID	10	6	10	15	17

What Should We Think about Americans' Beliefs Regarding Evolution?

In interpreting poll results, we should be careful about their underlying meaning.

LAWRENCE S. LERNER

The 2005 Harris Poll #52, summarized on pages 56–58, is in general agreement with other polls taken over the years: Many or most American adults believe that the universe (or at least Earth's biosphere) was created by fiat of the God of the Old Testament in pretty much the form we see it today. In particular, they believe that humans are not related to anthropoid apes, let alone other forms of life. Not surprisingly, a fairly strong correlation between these beliefs and the respondent's education, religious and political affiliation, and geographic location is superimposed on this general consensus. But few respondents hold that evolution should not be taught in public schools, even if they do not believe in its validity. How does one understand these apparently contradictory attitudes?

In interpreting such polls, one must be careful about their underlying meaning. What does it mean to "believe" in evolution or creationism (or, for that matter, both at once)? Scientific thinking of any kind plays a very small role in the daily lives of most Americans. Since their beliefs on scientific matters have little or no bearing on anything they do, they feel free to "believe" whatever is convenient and comfortable. Because many persons have come to believe that creationist notions are consistent with other social, political, and religious views they hold, they will respond with creationist opinions when asked by a pollster.

Unlike scientists, the general public does not understand that belief takes no part in scientific thinking. It is always the preponderance of evidence that takes precedence over personal feelings, no matter how strong they may be. (As T. H. Huxley put it, "The great tragedy of Science [is] the slaying of a beautiful hypothesis by an ugly fact.") And scientists are well aware of how extraordinarily preponderant the evidence is in favor of evolution, including human evolution. What is more, the scientist whose work is in the life sciences finds the tools that evolutionary fact and theory provide absolutely indispensable to making any real contribution.

Unfortunately, most Americans have little or no idea of the mass of evidence that substantiates evolution. Thus, when an eloquent proponent of creationism who possesses apparent scientific credentials tells them that evolution is false, or inadequate, or blindly accepted dogma, they do not recognize him as a crank or a pseudoscientist or a religious polemicist.

Many scientists, philosophers, and theologians have written extensively about all the forms of creationism, from young-earthism to Intelligent Design Creationism. They have demolished the scientific pretensions of the creationists, demonstrated clearly their sectarian religious agendas, and exposed their ultimately political aims. But these exposés are not widely known to the general public. Not knowing that a creationist has contributed nothing to the science he claims to represent, they can give his statements equal weight with those of working scientists who actually contribute to the progress of the life sciences.

Even those persons who "believe in" evolution generally do so on flimsy grounds. Not long ago, a man whose contact with science was typical of the general public was doing some work for me. He assured me that he "believed in evolution." Knowing something about my work, he may have been trying to please me. But I cannot put much weight on his views in the matter.

Of course, most Americans have studied at least some science at the elementary-school and high-school levels. Most high-school students, indeed, have taken some sort of biology course. Have they learned nothing at all? My own experience in teaching university-level physics casts some light on this question. Students in the introductory level course soon find that much of what they must learn is counterintuitive. Very early, they are exposed to Newton's first law of motion, which asserts that a body on which no force is acting maintains the speed and direction of its motion indefinitely. But this conflicts with the experience they had that very morning while driving their cars to campus. To keep the car going at a constant speed, they had to keep a foot on the gas pedal, thus supplying force to the wheels. And when they wanted to slow down, they removed the foot and thus the force.

In the "real world," that is, objects on which no force is acting soon come to rest; force is required to keep them moving. The contradiction of Newton's first law is evident. Of course, the better students come to understand that the coasting car is not an example of an object on which no force is acting, and they reconcile the two experiences in a consistent manner. Certainly, all students who want to become physicists must do so. But an awful lot of students who solve enough homework problems to pass the course come to believe that the real world and the "physics-class world" operate according to different laws. It is their obligation, of course, to learn enough about the "physics-class world" to pass the course (and maybe to become computer engineers or physicians or X-ray technicians.) But they feel no need to reconcile that world with the one in which they drive their cars and generally live their lives. And many of them never do so.

I am sure that biology teachers can tell similar stories. One can see why citizens who don't "believe" in evolution are nevertheless quite happy to have it taught in schools. After all, the biology class is the realm of the biology teacher and the "biology-class world," and most citizens are perfectly happy to let that world have whatever laws it may have. They want their children to get good grades and do not think the results will have much bearing on their "real" lives.

Committed creationists, of course, dissent sharply from this view. They believe exposure to evolutionary ideas can lead a young person to all sorts of immoral views and acts, which they list in frightening detail. But such zealots are a small minority. Most Americans don't think that a little evolution will pervert their children. Still, they have no objection to having a little creationism taught in class as well. After all, it will keep the evangelical preachers happy and won't make much difference in their children's education. And it's only "fair" to give everyone his due.

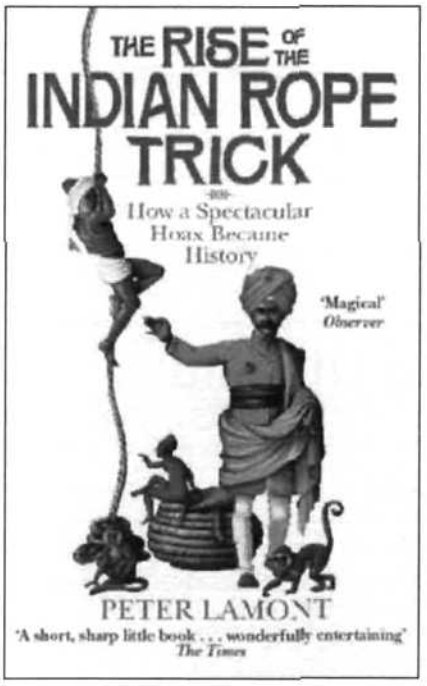
Does this mean I am complacent about the results of the poll? By no means! I am deeply concerned about the extent of scientific illiteracy in the American public. I am certain that many small improvements in the process of education can improve matters somewhat. But I am not convinced that we can expect a radical change in the scientific literacy of the American populace any time soon. What is perhaps more important, and more useful, is to convince the public that creationism is religion masquerading as science, and that teaching religion as science is unhealthy for religion, for science, and for education in general. □

Lawrence S. Lerner is Professor Emeritus, College of Natural Sciences and Mathematics, California State University, Long Beach.

The Trick Was a Trick

GREG MARTINEZ

The Rise of the Indian Rope Trick: How a Spectacular Hoax Became History. By Peter Lamont. Thunder's Mouth Press, Avalon Publishing Group, Inc., 2005. ISBN 1-56025-661-3. 264 pp. Hardcover, $22.



It has become so common an image that it has been used in countless children's cartoons: an Indian fakir, his head wrapped in a large white turban and secured with a large jeweled pin, charming a snake with a tune. If the plot required, he would direct his mesmerizing powers on a rope, which would climb straight up into the air and become rigid, allowing the hero a quick escape from his pursuers. Because these films are children's entertainment, this is a rather sanitized version of a gory magical feat that has entered into modern lore and is the subject of Peter Lamont's spellbinding *The Rise of the Indian Rope Trick: How a Spectacular Hoax Became History.*

As the subtitle indicates, and Lamont's far-ranging and dogged research shows, the rope trick is not simply a magic trick, but a deliberate and flimsy hoax that was perpetrated at the right time in history to capture the imaginations of Westerners about the mysterious East, and perpetuate itself into a kind of visual shorthand for the entire idea of Eastern Mysticism and Orientalism.

Lamont finds that the origin of such a potent and enduring myth lay in a mundane place: a newspaper circulation war in Chicago in 1890. John Elbert Wilkie, a young reporter for the *Chicago Tribune* (who would eventually go on to be an early director of the Secret Service) published an unsigned article in the August 8, 1890, edition on the front page of the second section. It purported to be the true account of a journey to India by two Yale graduates. They tell a tale of seeing a street juggler (as they were called back then) who took a ball of twine and, while holding the loose end in his teeth, threw the ball into the air, whereupon it unraveled until the end was out of sight. A small boy climbed the twine until he was thirty to forty feet in the air, then disappeared.

Months later, after a letter to the editor pressed the issue, the newspaper retracted the story, admitting in an unconvincing fashion that the article had been "written for the purpose of presenting a theory in entertaining form." Like most newspaper retractions, this admission of error had no real effect. The myth was off and running.

The myth was boosted to a canter by the investigation of claims made by Sebastian Burchett to the Society for Psychical Research in Britain that he had witnessed the trick. After much investigation, the Society dismissed his report as unreliable. A few months after Burchett's flirtation with the tale, an anonymous woman pushed the story to a full gallop by elaborating on the core story with horrific detail. She reported having seen the trick, and embellished it by saying that the boy refused to return so the angry juggler climbed the rope himself brandishing a large knife. Shortly after his disappearance up the rope, bloody body parts rained down from above as the disobedient child was dismembered for his naughtiness. After the head was thrown down, the juggler would climb back down, cover the body parts with a shroud, mumble an incantation, and the boy would appear from under the sheet whole, smiling and presumably more obedient. It was an electrifying story whose truth was irrelevant to most readers. Waves of reports, like UFO flaps generations later, would hit newspapers and magazines throughout Europe with an almost predictable regularity.

Lamont particularly relishes the tale of one of the "witnesses," a member of the British aristocracy of the type

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routinely parodied by P.G. Wodehouse, with the Wodehousian name of Lady Waghorn. In 1925, she came to the public's attention with her tale of having witnessed the trick in 1891 during a visit to Madras. The fact that she had managed to go thirty-four years without ever mentioning such an astounding and disturbing spectacle while on holiday to any friend, relative, acquaintance, or servant did nothing to dissuade her from insisting her story was factual.

Lamont delights in relating the bizarre explanations for the trick offered up by equally bizarre characters. In the 1930s, Hitler's secretly Jewish personal psychic Erik Jan Hanussen ventured that the rope was actually a segmented pole made of sheep bones. In 1955, the peripatetic John Keel weighed in with the opinion that the trick was done by the fakir hanging the rope on a long human hair suspended between two hills and the fakir and the boy only pretending to argue while pieces of a dead monkey rained down. In the 1960s, an Indian mystic offered to teach the trick to anyone who would refrain from eating meat and having sex for three weeks. Uri Geller, in his official biography published in the 1970s, explained that the trick was part of mass hallucination induced by telepathy. As Lamont sharply concludes: "One could choose ... between the views of a Jewish Nazi clairvoyant or those for an ambassador for psychic aliens, between chopping up a monkey or becoming a vegetarian celibate."

Despite such lurid and preposterous subject matter, Lamont has produced a masterpiece of scholarship and entertainment. The book is exhaustively researched and carefully written with a delightful wit and verve. Lamont is mindful of the fact that his story is closer to a sketch by Monty Python than traditionally written and researched histories, and in his author's note he addresses the reader directly to explain his use of extensive endnoting: "... many of the events and characters in this book are so bizarre that you, the reader, might wonder whether they actually happened, whether they really said what I claim they said. At that point you may wonder whether I am being truthful and accurate, whether I can be trusted. And that would hurt my feelings."

Be assured, Professor Lamont: the magic of your book is no hoax.

Bigfoot in Life and Legend

BENJAMIN RADFORD

Bigfoot Exposed: An Anthropologist Examines America's Enduring Legend. By David J. Daegling. AltaMira Press, New York, 2004. ISBN 0-7591-0539-1. 276 pp. Softcover, $24.95; Hardcover, $72.

It's not for lack of evidence that Bigfoot remains a mystery. There's plenty of evidence; the problem is that most of it isn't good evidence. Similarly, there are plenty of books on Bigfoot, but much of what is out there just isn't very good. Hundreds of books advocate for the existence of Bigfoot through mystery mongering or suppressing the skeptical view. David Daegling's new book, *Bigfoot Exposed*, is the first to encompass the Bigfoot phenomena as a whole, tackling both hard and soft evidence from an anthropological point of view.

Benjamin Radford wrote "Bigfoot at 50: Evaluating a Half-Century of Bigfoot Evidence" for the March/April 2002 SKEPTICAL INQUIRER.

The book begins with a would-be Bigfoot sighting that Daegling and a few friends experienced first-hand. It was a terrifying encounter out in the wilderness, something large and hairy and—at least initially—unidentified. He makes an important point when he asks, "What would have happened if my brother hadn't gotten his flashlight? I would have lost a night's sleep and would have forever wondered what had wandered into the edge of our camp." This example addresses an often overlooked significance of Bigfoot encounters: they are unforgettable, often terrifying, and at times life-changing experiences.

Daegling brings incisive insight to a field plagued by poor evidence and often muddled by faulty arguments and red herrings. Daegling exposes fuzzy reasoning and logical fallacies in the arguments of Bigfoot advocates, such as the claim that Bigfoot aren't seen more often because they live only in very remote areas. If that's so, Daegling asks, then why are there so many reports from populated areas? Logical fallacies such as special pleading, appeals to authority, and the false-choice dilemma are noted, as well as authors who selectively omit evidence (the systemic purging of hoaxer Ray Wallace's legacy from several otherwise thorough Bigfoot books is given as an example). Daegling calls this "a troubling practice, one that a field on the fringe of scientific legitimacy can scarcely afford."

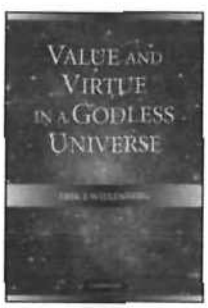
The book is even-handed in its analysis, and though obviously a skeptical inquiry, has been generally well received by the advocate camp. The Anomalist online magazine selected *Bigfoot Exposed* as "The Best Skeptical Cryptozoology Book of 2004," though one wonders why such a distinction is made. After all, skepticism is simply demanding proof prior to acceptance and applying scientific methodology to a topic. One would hope that *all* investigative books would be in that sense skeptical. The category's name highlights the glaring absence of truly skeptical books on the subject.

Bigfoot Exposed offers a survey of the major characters in the search for Bigfoot, observations on footprints, hoaxing, Bigfoot anthropology, the Patterson film, eyewitness testimony, and the lack of a fossil record for the creature. Daegling's prose is lucid and thorough, at times erring on the side of overexplaining. This tendency is understandable given the contentiousness of the topic; better to belabor a point than risk being misunderstood.

The real contribution of *Bigfoot Exposed* is Daegling's ability and willingness to identify key issues often lost in the morass of claims and counter-claims. He points out, for example, that "Bigfoot data never really get any better and thus there is no gravity to the claim that we are closing in on the animal." Unlike nearly every other area of scientific inquiry, evidence for the phenomenon has barely improved over the last half-century. We are no closer to identifying Bigfoot now than we were last month, or last year, or in 1958 (when Bigfoot became famous).

Daegling, an associate professor at the University of Florida, takes a much-needed anthropological view of the issue. He writes, "The mythological value of Bigfoot, its importance for those who seek it, has nothing to do with its zoological reality." Though Daegling doesn't mention it, much of his discussion and analysis is applicable to the searches for other mysterious creatures, from lake monsters to the goat-gashing *chupacabra.* Similar methodological flaws and fallacies plague those endeavors as well.

Bigfoot proponents have long requested a scientific examination of the phenomena; *Bigfoot Exposed* provides it. This book is simply the best and most thorough critical analysis of the Bigfoot phenomena; it is instructive for lay readers, skeptics, and advocates alike.



Can Atheists Be Ethical and Virtuous?

PETER LAMAL

Value and Virtue in a Godless Universe. By Erik J. Wielenberg. Cambridge University Press, New York, 2005. ISBN: 13 978-0-521-60784-1. 193 pp. Softcover, $20.99.

It is safe to say that many, perhaps the overwhelming majority, of those who believe in God (theists) also believe that atheists cannot really be virtuous and ethical. If an atheist appears to be such it is only a façade; deep down, that atheist is immoral or at best amoral. Erik Wielenberg's goal is to show that this belief is false. His purpose is not to argue for the truth of naturalism, that is, the claim that there are no such things as supernatural beings. Rather, he explores the ethical implications if naturalism is true.

Wielenberg first examines, and rejects, four arguments for the claim that if God does not exist all human lives are meaningless. Next he considers the view "that without God, while we may have certain moral obligations, we have no particular reason to care about what our obligations are." He goes on to consider whether in a naturalistic universe humility, charity, and hope are possible. In the last chapter Wielenberg considers the age-old notion that we should inculcate certain supernatural claims, not because they are necessarily true, but because they foster good behavior.

The book concludes with a discussion of whether naturalism is a creed we can live with.

Most of the first three chapters are devoted to the kind of philosophical discussion, analysis, and argumentation (in the professional sense of the term) that will not appeal to many in the general population of readers. The remaining two chapters should be of particular interest to SI readers. In those chapters Wielenberg asks whether science can be helpful in developing moral persons. Unfortunately, he subscribes to the current emphasis on neuroscience as the almost complete account of our behavior, ignoring such fields as behavior analysis (that emphasize the importance of our individual life histories and environments, while readily acknowledging the importance of our biological structures and functioning).

This book provides a conceptual underpinning for the empirically demonstrable truth that many atheists behave virtuously and many religious believers do not. □

Wielenberg considers the age-old notion that we should inculcate certain supernatural claims, not because they are necessarily true, but because they foster good behavior.

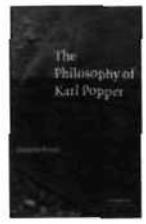
Peter Lamal is an emeritus professor of psychology at the University of North Carolina–Charlotte and a fellow of the division of Behavior Analysis of the American Psychological Association. E-mail: plamal@carolina.rr.com.

Listing does not preclude future review.

Dictionary of Atheism, Skepticism, & Humanism. Bill Cooke. *Prometheus* Books, Amherst, New York, 2005. 550 pp. $70 hardcover. Intended as a companion piece to Tom Flynn's *New Encyclopedia of Unbelief*, this hefty compendium of more than 1,600 entries, written by Bill Cooke, the international director of the Center for Inquiry, deals not only with the modern terminology of free thinkers, but also with people whose lives or ideas have affected the universe of free thinking. With material ranging from "Age of Reason," "Steve Allen," and "Anthropic Principle" to "Wahhabi Islam," "H.G. Wells," and "Zarathustra," Cooke's clear, thoughtful entries make the book accessible as well as fascinating. In the preface, he remarks that the book is designed for "free thinkers in the broadest sense of the word, people who like to think for themselves, and not according to the preplanned routes of others."

The Republican War on Science. Chris Mooney. Basic Books, New York, 2005. 328 pp. $24.95, hardcover. Chris Mooney, a journalist with a background in political writing

(and an SI contributing editor), reports on "controversies at the intersection of science and politics." In this, his first book, Mooney argues that science's influence in politics has dipped drastically in the last fifty-odd years. He contends, supported with much evidence he has accumulated (he includes fifty-three pages of notes, and the list of interviews he conducted and interviews he requested but that were declined extends over eight pages), that the Republican party's overwhelming presence in the Bush administration and the politicians' willingness to selectively sift through scientific findings, using half-truths to emphasize and conduct a political agenda, is blindfolding the public with misinformation. He takes the "Republican Phenomenon" of an "increasing unwillingness to distinguish between legitimate research and ideologically driven pseudoscience" then navigates through the party's acceptance of pseudoscience, using current debates such as climate research, stem-cell research, creationism, "The Data Quality Act," and "junk science."



The Philosophy of Karl Popper. Herbert Keuth. Cambridge University Press, New York, 2005. 367 pp. *$70 hardcover*, $28.99, paperback. A systematic exposition of the philosophy of Karl Popper (1902–1994), one of the greatest and most influential philosophers of the twentieth century (*The Logic of Scientific Discovery* is his masterpiece). Author Keuth is a professor of the philosophy of science at Tübingen. Part I, the largest and most important section, deals with Popper's philosophy of science. Topics include the problem of induction, the problem of demarcation (falsifiability as a criterion, metaphysical statements, testability, etc.), the role of theories (including causality, prediction, and universality), the problem of a theory of scientific method, the problem of the empirical basis, corroboration, realism, verisimilitude, and probability. Part II discusses Popper's social philosophy. Part III, Metaphysics, includes discussions on determinism vs. indeterminism and the mind-body problem (including objective vs. subjective knowledge, argumentation and imagination, and interaction and consciousness).

—Kendrick Frazier and Kathryn Landon

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By arrangement with *Scientific American* (www.sciam.com), September 2005.

Praying for Jane

SUSAN BURY

A dear friend of mine, Jane, drowned recently during a canoe accident on a river rapids in an Ontario wilderness.

I spoke with her husband, Gary, two days after the accident. He had been carried downstream by the rapids and had eventually found his way to help. Jane was still missing at that point, and there remained hope that she would be found alive by the massive search that was underway.

When I asked Gary if there was anything I could do to help him, he said to keep Jane in my thoughts and prayers. Then he quickly doubled back and said, "Well, not necessarily prayers in a traditional religious sense, but in your thoughts."

I know what he was thinking. In dinner conversations with Gary, Jane, and other friends, I'd talked occasionally about being an atheist. Gary, a true gentleman even in his time of personal crisis, didn't want to offend me by asking for my prayers, so he quickly modified his request.

I didn't want him to feel awkward, especially in those awful hours of waiting for word from the search teams. So I reminded him of the old saying that there are no atheists in foxholes. That is, besieged soldiers suddenly in danger of their lives without apparent hope of rescue often "get religion" and appeal for help to—whom? God is the obvious answer. Sometimes people in such situations will try to strike deals, promising future good deeds in exchange for rescue now.

The more I thought about the conversation, the more I realized it was true for me. I did have the impulse to pray that Jane would be found alive. I couldn't do anything to help the search, and I couldn't be of much practical use to Gary while he waited (although I and other friends managed to get a bottle of scotch to him).

So I tried a conditional request, sort of a skeptic's prayer: "If there's somebody out there who's in charge of day-to-day operations, and if I've earned any points at all for good behavior, please put them toward letting Jane live." I found myself considering the terms of a deal, offering certain charitable acts in exchange for Jane's life. But then, the utter absurdity that the creator of the universe would bargain with me over another person's life, especially with my record of skepticism, brought me up short.

This event and others in my life have made me more sympathetic to the great many wonderful people I know who are religious. When their friends are in trouble, they want to do something, which is generous and admirable. Religion and prayer offer the gratifying sense that you're making a difference, especially when you can't do anything on the ground.

And as far as an afterlife, nothing would make me happier than having an opportunity to tell Jane and a lot of other people how much they meant to me and to ask their forgiveness for my blunders. Further, it seems to me that any decent skeptic has to be open to the possibility that at any minute, the skies could part, lightning bolts could flash, and a Prime Mover could appear and in a thunderous voice start asking for the SKEPTICAL INQUIRER subscriber list.

So while Jane's religious friends prayed in their way, I prayed in mine.

But you already know the end of the story. The answer to all of the prayers was no. In the end, I don't think anyone was listening. There's no God who would pluck Gary out of the rapids and let Jane die. No God who would let some people escape the Twin Towers on September 11 and let others perish.

Jane died because of a set of physical circumstances, the outcome of billions of threads of geologic forces and human evolution intertwining over eons of time. All of that resulted in a rapids existing in that spot and Jane being there right then. Her death was part of the continuity of time.

When nonbelievers confront crises, we can't avail ourselves of the comfort of praying, of taking some action to make things better. In a sense, our skepticism leaves us powerless.

More positively and realistically, our stance should increase our commitment to doing what we really *can* do. You've often heard that instead of waiting for your dear friends' memorial services to tell them you care, tell them now. Our skeptical stance should add urgency to this advice.

In the end, Jane herself gave me the best answer. Gary told us that just moments before they reached the rapids, they were on a glassy-smooth lake in a pristine wilderness of thick forest; Jane's favorite kind of place. Gary said she leaned back, resting her paddle across her knees, looked at the sky, and called out, "Thank you, universe!"

Rather than fussy rituals and fervent bargaining with imaginary powers, our best approach to life may be humility before the staggering complexity of what surrounds us and gratitude for everything we have. □

Susan Bury writes from Red Lodge, Montana.

Skeptical Inquirer
Carl Sagan
Questions and Answers from His 1994 Keynote Address
Ann Druyan: The Great Turning Away
JAMES RANDI
Fakers and Innocents: The $1 Million Challenge
The Curious Problem of Fritjof Capra
Debating the Skeptic Label

Carl Sagan's Gracious Style

I greatly enjoy SKEPTICAL INQUIRER, and I am grateful for the genuine service you are providing for the world.

When I read the Q&A with Carl Sagan (July/August 2005), I was struck by his graciousness, his focus on ideas instead of people. One questioner accused him of ridicule. Sagan could have said, "You're wrong, I wasn't ridiculing." He could even have said, "Apparently you are incapable of distinguishing ridicule from vigorous debate." Instead, he said, "I didn't think I had any ridicule there," and he stayed engaged with the questioner. Time after time, he was classy and focused on the issues; time after time, he declined invitations to brawl. To me, his style is a major reason why he was so effective.

When I contrast Sagan's style with articles in SI, I realize why I often cringe as I read. I see *ad hominem* attacks, derision, and fighting words. To me, those tactics make the articles ineffective. I think their style diminishes their content.

Sagan demonstrated the persuasive power of clarity and grace. May I suggest that toning down some of the attitude would enhance SI?

Thank you for your great work!

Mark Chussil
Portland, Oregon

One portion of the excellent article, "Carl Sagan Takes Questions," leaves me with very mixed emotions.

I quite agree that ". . . an all-out attack on religion . . . would be foolish, but the idea of treating biblical literalism, for example, with some skeptical scrutiny is an excellent idea." Unfortunately, he goes on to say, "But it is being done. . . . I don't think there's any particular expertise in this (skeptical) movement for a critical examination of the Bible. There are other people who are doing it just fine."

In a sense, that latter statement is true, but those "other people" are not reaching a general audience to any great extent and their motives are commonly pointed at increasing the credibility of the biblical message, not casting doubt on it.

It is not necessary to develop the expertise to conduct original research into biblical esoterica in order to conduct a perfectly valid analysis. There are ample secondary sources available to lay persons who seek them out. For the past fifty years, I have been collecting bits and pieces. The information is out there. The problem is that it is scattered in a thousand places, most of which are not readily accessible to the general public.

No, we should not launch an all-out attack on religion, but I am convinced that a "partial mobilization" against fundamentalism would be appropriate and valuable. And I mean fundamentalism in all its guises: Islamic militants, Jewish zealots, and Christian fundamentalists are sisters under the skin.

I am further convinced that the "Four Horsemen" most threatening to human welfare in the twenty-first century are: Ignorance, Superstition, Zealotry, and Greed. Fundamentalism is rooted in the first three, and greed is the great motivator for pandering to, exploitation of, and manipulating the fundamentalist movement.

Clyde A. Wilkes
[No address given]

Ann Druyan's 'Turning Away'

In "The Great Turning Away" (July/August 2005), Ann Druyan ponders how we in the contemporary United States have turned our backs on her iconic husband's vision of the "*wonders* (italics hers) of the universe revealed by vigorous *skeptical* science. . . ." And, to be sure, Carl Sagan was—and remains—an icon who did, with little fear of contradiction, more than any other contributor to make available to the general public both the subject matter and method of the discipline he served. All the sadder, then, the disservice that Druyan does to the causes of science and skepticism by the inappropriate extensions and imprecise definitions contained in her remarks.

As a form of truth in advertising, I should confess that, while I sample pieces from several periodicals, I read two scrupulously cover to cover. Those two are the *National Review* and the SKEPTICAL INQUIRER. So it will come as no surprise that I find myself relatively at home among two very different and sometimes very competitive perspectives on whichever topics happen to come under discussion. I am, for example, frequently uncomfortable with the confining positions taken by my friends at the *NR* on human stem-cell research in a situation where, even with respect to the often perplexing moral difficulties involving the use of fetal tissue, I see an overwhelming potential good for the prevention and cure of a whole category of human afflictions. But likewise, I am today equally uncomfortable with my friends at SI, if indeed Druyan's opinions are broadly held, and with the critical and unbalanced opposition to the foreign-policy approaches taken by the current administration and president who, in Druyan's words, "with impunity makes illegal and baseless unprovoked war." Holy mackerel! There's a phrase that leaves *statement* behind, passes right through *opinion*, and moves straight on into diatribe. Then, two articles later, we return tranquilly and happily to SI's traditional standards of rational evaluation in James Randi's piece demanding clear rules and precise definitions of terminology in the application of skeptical judgments.

Cheers for Sagan and cheers for Randi. And, please, let's leave political hyperbole where it belongs—well outside the pages of the SKEPTICAL INQUIRER.

John Walter Putre
jputre@visi.net

With brain-numbing incredulity I have just read Ann Druyan's statement in "The Great Turning Away": "Our president declares himself an instrument of God and with impunity makes illegal and baseless unprovoked war."

I am inclined to forgive Ann Druyan for this belch of rage. Her scientific greatness surpasses all of us and our penchant for Bush bashing! Alas, she has caught the human virus of hate and must be granted allowance in the same manner she forgives all of us in our collective celestial ignorance.

But it hurts. When our heroines suffer maladies, we suffer too.

Give her time to recognize her indoctrination. She will emerge. And mankind will, as it always has, continue to benefit from her inherent wisdom.

Harold V. Blackman
Montrose, Colorado

Over the last few years, I have been reading with greater dismay the more than occasional rant of liberal political views going on in my favorite magazine. When did SI go from busting charlatans and psychics and sticking up for proper science to seemingly constant bashing of religious and political conservatives? Some of these attacks have been passive-aggressive, and some have been outright dismissals.

I am referring to Ann Druyan's op-ed piece. While she logically argues for the good-ole days of science writers like Carl Sagan, she rejects his appreciation that he felt for the better parts of religion. Then she makes baseless claims that we are fighting an "illegal and baseless unprovoked war," led by a president who "declares himself an instrument of God."

I do not feel that Druyan does justice to her side of the argument or justice to her late husband's legacy by making such claims in a science magazine, claims that belong in political discourse instead. She may be damaging the whole humanist movement by helping to create an image of religious-intolerance-like thinking on the part of humanists!

Sam Brown
San Jose, California

Ann Druyan comments that: "Consider all the futures depicted in science fiction. . . . How many of them imagine a future in which the dominant religious traditions and beliefs of the present survive?" Well, one that certainly does is the *Childe Cycle* series of Gordon R. Dickson, in which Christian religious extremists dominate/rule two whole worlds. This is not just a sideline, because the idea of faith is central to *Cycle*. Certain concepts Dickson lays out, including the idea of humanity splitting into subcultures that divide, leave Earth, and evolve to their limits make the *Childe Cycle* one of the most realistic future societies conceived. To many fans of SF, Dickson's vision is only equaled by Heinlein's *Future History*, Asimov's *Foundation* series, and Herbert's *Dune* novels. Some even think that it surpasses them. The point is: there are compelling SF futures where present religions exist and play a major role in those futures.

Liam McDaid
Astronomy Coordinator
Sacramento City College
Sacramento, California

Fritjof Capra's Worldview

Burton Guttman's analysis of Fritjof Capra's worldview (July/August 2005) awakened old memories. About 1977, Capra was a guest speaker on the campus where I was a faculty member. He had been invited (and paid well) to discuss his macaronic theological opus, *The Tao of Physics*. What he really wanted to talk about, though, was his new devotion to traditional Chinese medicine. Being a young, healthy man at the time, Capra had found that his *tai ch'i* teacher could fulfill all his medical needs. He was voluble on the subject, and finally made the flat statement, "Modern medicine never cured anybody of anything."

I happened to be on the panel that was to discuss his talk, and I couldn't let that pass. At the time, the worldwide smallpox-eradication program was nearing its conclusion. There was only one small focus of smallpox left, somewhere in Somalia, and that was eradicated soon afterward. So I said, "The human race has plenty of things to be ashamed of, but if there is one thing it can be proud of, it is the eradication of the horrible scourge of smallpox."

With a straight face, Capra replied, "Modern medicine has had nothing to do with that."

My jaw dropped. I asked, "How do you explain the fact that smallpox is about to disappear from the face of the earth?"

"Oh," said Capra, "it's just been going away by itself."

Needless to say, I never again felt the need to take seriously anything Capra had to say.

Lawrence S. Lerner
Professor Emeritus
College of Natural Sciences and Mathematics
California State University
Long Beach, California

Burton S. Guttman rightly points out the sloppiness of Fritjof Capra's thinking and the shallowness of his knowledge. However, he's a little too quick to ridicule General Systems Theory. In fact, General Systems Theory is yet another branch of knowledge that Capra knows little about.

General Systems Theory is a small but respectable interdisciplinary school of thought that flourished between about 1940 and 1980. Although its adherents included mathematicians, philosophers, sociologists, and psychologists, its main contributions were probably to cybernetics and advanced modeling techniques.

Where Capra goes wrong is in seeing General Systems Theory as a replacement for reductionism in every circumstance. Although it is hard to generalize about a large group of diverse thinkers, major figures in the school such as Gregory Bateson did not see their work as replacing reductionism but as supplementing it. In particular, they thought it self-evident that reductionism, although obviously successful in the hard sciences, was often not very useful in the social sciences.

As he does with almost every thought he stumbles across, Capra overextends, oversimplifies, and over-mysticizes General Systems Theory and makes it something far removed from what it originally was: a critique of science made mostly by working scientists.

Bruce Byfield
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The Skeptic Label

Alejandro J. Borgo's article, "What Should We Do with Skepticism?" (July/August 2005), raises an issue I've long thought about, although more with respect to the "snarl term" (*pace*, S. I. Hayakawa) *atheist*, which I happen to be. *Atheist* is a term guaranteed to raise hackles in almost any context, whereas, contrary to Borgo's position, I have found *skeptic, skeptical*, etc., not at all inflammatory. For example, one can hear all sorts of people using some variant of the words, e.g., "Hey, when you go in to talk about buying a new car at XYZ Motors, you'd better be darn skeptical—those guys are likely to tell you anything" and so on.

However, let's grant Borgo's assertions. I identify myself, in whatever context such identification is relevant, as an *evidentialist*. This term usually results in one of two responses: (1) "Oh" or (2) "*Evidentialist?* What's that?" In the first instance, I take the "Oh" (or whatever equivalent grunt I get) to mean, "Well, OK, doesn't bother me one way or the other." In the second, I am given

an opportunity to explain what such a designation means. Inevitably, I get into questions of logic, the rules of evidence, and other related, intellectually salutary, matters.

The beauty of *evidentialist* is that it carries none of the negative freight of *atheist* (or even *agnostic*) or, with respect to Borgo, *skeptic*. No red flags, just an opportunity to open a rational discussion. And it does; indeed, I'm convinced I've succeeded in opening more than a few minds. (I am a retired professor of English and linguistics and just can't stop professing!)

Henry F. Beechhold
Professor Emeritus
The College of New Jersey
Corrales, New Mexico

Alejandro Borgo describes our image problem of being called skeptics. It's really a linguistic problem, because abstractions and vague terms standing alone permit the hearer to overinterpret: freedom (of what), respect (for what), love (of what). Such concepts require qualifications to make any sense. The opposite of skepticism may be credulousness, gullibility, blind faith, superstition, or naïveté; we regard these as negative characteristics, but others take skeptics or debunkers as negativists.

Skeptics have always existed, and some of our well-known antecedents have been associated with heresy, humanism, and enlightenment. Heresy sounds obsolete now, and enlightenment can be misapplied in various ways, but humanism remains a clearer concept, as in "secular humanism." It can also appear meaningfully without a modifier, as it did about 500 years ago. Should this journal be called *Humanistic Inquirer*?

Harvey Dunkle
San Diego, California

I want to alternately hug and admonish Mr. Borgo for his finely written, though misguided, article. This man is truly an eloquent proponent of the skeptical movement, and I've heard only good things about his work on *Pensar*. However, I strongly disagree that a nicer image for skeptics is the direction we need to be going in. I find his argument, that the label "skeptic" leaves us open to such negative appelations as *naysayer, refuter, debunker,* and *spoilsport* oddly lacking in temerity. In a world filled with yea-sayers and bunkers, I openly profess to be all of the former.

Let's not dilute our identity as skeptics by reworking our image but rather let's continue to hammer away at false claims in the unflinching manner that Galileo refuted and James Randi debunks. Our opponents favor the (at best, "window-dressing" and at worst, deceptive) practice of assuming new images, à la Intelligent Design. We expose them to the public as the deceivers they are, as they will readily expose us if we ape their ways.

I respectfully suggest to Mr. Borgo that the people who view skeptics in a negative fashion do so because the scientific method spoils one or more of their beliefs. We could call ourselves the sugar-and-spice fairies from the planet Buckets of Rainbows and Love, and they'd still hate us for the way our skepticism methodically destroys their most cherished fantasies.

Thank you for your wonderful magazine.

Michael Hinckle
Oak Creek, Wisconsin

My wife and I read with interest your article, "What Should We Do with Skepticism?" We both entirely agree with Mr. Borgo's sentiments that your present name(s) are a detriment to CSICOP's overall efforts. As he says, your present name, SKEPTICAL INQUIRER, and other names that were recently proposed do not help people know of the positive, uplifting programs conducted by your members and other resources that you offer.

Henry Gurr
Aiken, South Carolina

I have to agree with Alejandro Borgo. I think we could have a greater impact if we were the *Rational Observer* rather than the SKEPTICAL INQUIRER.

Lynn Torbeck
[No address given]

Alejandro J. Borgo's ruminations on the label "skeptic" left me, well, skeptical. We're not going to win anyone over with public-relations gimmicks or softening the image with a name change. No doubt many people have the "You don't believe in anything" reaction, but so what? We weren't going to get their votes anyway.

Personally, I prefer the term *agnostic*, because you usually have to define what that means. This gives you an opportunity to explain the skeptical position and often generates prayers for your soul. Shows what we're up against.

The proposed *bright* to replace *skeptic* seems stupid. *Freethinker* works fine for me but requires more explanation. And while being a naysayer, refuter, spoilsport, or debunker won't change anyone's mind, it can be a lot of fun. And somebody's got to do it.

Neal Wilgus
Corrales, New Mexico

Unfortunately, the very honorable name of this magazine, SKEPTICAL INQUIRER, has probably become counterproductive to the purposes of the publication. The climate of the times in the U.S.A. calls for a name change. Here are some suggestions:

Science and Reason
The Magazine for Science and Reason
Bimonthly for Science and Reason
Reason and Thought
The American Magazine for Science and Reason
Reason, Thought, and Superstition

Fred Kohler
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Borgo's article, "What Should We Do with Skepticism?" is an interesting one. As a skeptic, I agree we have a bit of an image problem. And no, I'm not fond of the title either. But as a print journalist, I take exception to a few of his observations on the media.

First, he suggests that print media fall between TV and radio "according to their degrees of sensationalism, frivolousness, and superficiality." I'm not sure how he came to this conclusion. Such a statement overlooks the work of print media such as *Scientific American, National Geographic,* and this very publication.

I suppose he also forgot that the majority of research is published in what one would call "print media." Yet curiously, I know of no radio program that broadcasts scientific research or even attempts in-depth coverage of research. Second, in an attempt to be objective, I usually try to get multiple sides of a story. I can easily say I've never labeled someone as a "skeptic" and certainly not as a "naysayer." Typically, most journalists refer to people by the title they hold, such as biology professor or executive director.

Andrew Dunn
Lakeland, Florida

Going through Alejandro J. Borgo's piece, "What Should We Do with Skepticism?," in which he speaks of naysayers and refuters, I noticed he nowhere used the one key word that I often hear regarding skeptics. To a lot of people out there, the word *skeptic* is synonymous with *cynic*. I think we need to throw that word in to more clearly express the negative image we radiate and the negativity we face.

Don Addis
St. Petersburg, Florida

Fleeting Fame

A charlatan such as Nino Pecoraro sought out fame by being a fraudulent spiritualistic medium. He reminds me a lot of Uri Geller, whose claim to fame was bending eating utensils. While Sir Arthur Conan Doyle will be forever remembered for his creation of Sherlock Holmes and Houdini will also be forever remembered for being a top-notch magician and escape artist, poor Nino Pecoraro is completely forgotten in the mists of history.

After reading this article, I will still remember Sir Arthur Conan Doyle's name. I will remember Houdini's name, and I will have forgotten Nino's name within a few months time. His fame was fleeting and he was probably the first man to have that short fifteen minutes of fame.

Rosemarie Roberts (Rosita Causing)
Sacramento, California

Far from Carr's First Failure

You ran a brief news article on Anthony Carr's inability to use his psychic powers to help solve his granddaughter's abduction (July/August 2005). This is far from his first failure, and I documented an earlier failure on ApatheticAgnostic.com in "Meditation 72" nearly three years ago.

On October 27, 2002, in *The Calgary Sun*, Carr made a specific prediction about the actor Richard Harris: "Richard's cancer will go into remission; the third Potter film wins him industry-wide applause." Unfortunately for Carr, Harris had died two days previously. Carr's psychic powers failed to protect him from the embarrassment of a late and false prediction.

John Tyrrell
Medicine Hat, Alberta
Canada

Questions for ID Proponents

The pro-evolution community is missing a great teaching opportunity regarding Intelligent Design. High schools are not merely places to dispense data for memorization but also a place to teach critical-thinking skills to young people before they become stodgy, old adults. Like it or not, many students have competing origin-of-life "theories" on their minds. Instead of reacting with alarm and appearing fearful of discussing ID, biology teachers should embrace the chance to examine ID openly and critically.

Perhaps a few teaching points will illustrate how ID falls apart upon critical examination:

- How many designers were there? (One per solar system? One per planet?)
- Were there different designers for mammals, reptiles, insects, etc.?
- Were there competing designers, such as for predators versus prey?
- Were there subsequent designers? (The Wright brothers may have designed the first successful airplane, but they did not design the 747.)
- Is the original designer still designing or retired? (Or dead?)
- Did the designer make mistakes? (If not, why have millions of women died during natural childbirth? Why did dinosaurs and various species of protohumans die out?)
- Is mankind a better designer than the original? (Are eyeglasses, heart pacemakers, insulin shots, artificial hips, incubators, etc., evidence of improvements mankind has made over the poor original design?)
- Is only one inhabitable planet in this solar system evidence of massive inefficiency on the part of the designer? (Is this worse than the typical government program?)
- Who designed the designer? (If the original designer didn't need to be designed, then why does anything else?)
- Are we made in the designer's image? If so, what does the designer need legs for?

High schools should teach not just what we know but also how we know what we know.

John Clinger
Richmond, Virginia

Perhaps we might counter the proponents of Intelligent Design by not opposing the teaching of their "theory"—provided they grant equal time to the theories of Malevolent Design and Incompetent Design. How else (we might ask them) did we end up with appendixes and bad backs?

Howard J. Wilk
Philadelphia, Pennsylvania

Ordinary Evidence Enough

My thanks to William Harvey (Letters to the Editor, July/August 2005) for stating what I've felt for some time. Extraordinary claims should not necessarily require extraordinary evidence. Ordinary rules of evidence should suffice, or else we have a double standard apparently only invoked for people we consider crackpots, er, I mean unusual claimants. As the Amazing Randi related so adroitly in the same issue, debunking extraordinary claims can be done quite satisfactorily using everyday, garden-variety rules of testing and evidence.

John Clinger
Richmond, Virginia

Comforting Thoughts

After reading Greta Christina's "Comforting Thoughts about Death," the related letters to the editor that appeared in your July/August 2005 issue, as well as her reply, I want to encourage you to publish more of her essays. I'm impressed! She has expressed, in my opinion, some great concepts, and I do find them comforting.

Tim Richards
Lunenburg, Massachusetts □

The letters column is a forum for views on matters raised in previous issues. **Letters should be no more than 225 words.** Due to the volume of letters not all can be published. Address letters to Letters to the Editor, SKEPTICAL INQUIRER. Send by mail to 944 Deer Dr. NE, Albuquerque, NM 87122; by fax to 505-828-2080; or by e-mail (send as e-mail text, not as an attachment) to letters@csicop.org (include name and address).

THE COMMITTEE FOR THE SCIENTIFIC INVESTIGATION OF CLAIMS OF THE PARANORMAL

AT THE CENTER FOR INQUIRY–*INTERNATIONAL* (ADJACENT TO THE STATE UNIVERSITY OF NEW YORK AT BUFFALO)

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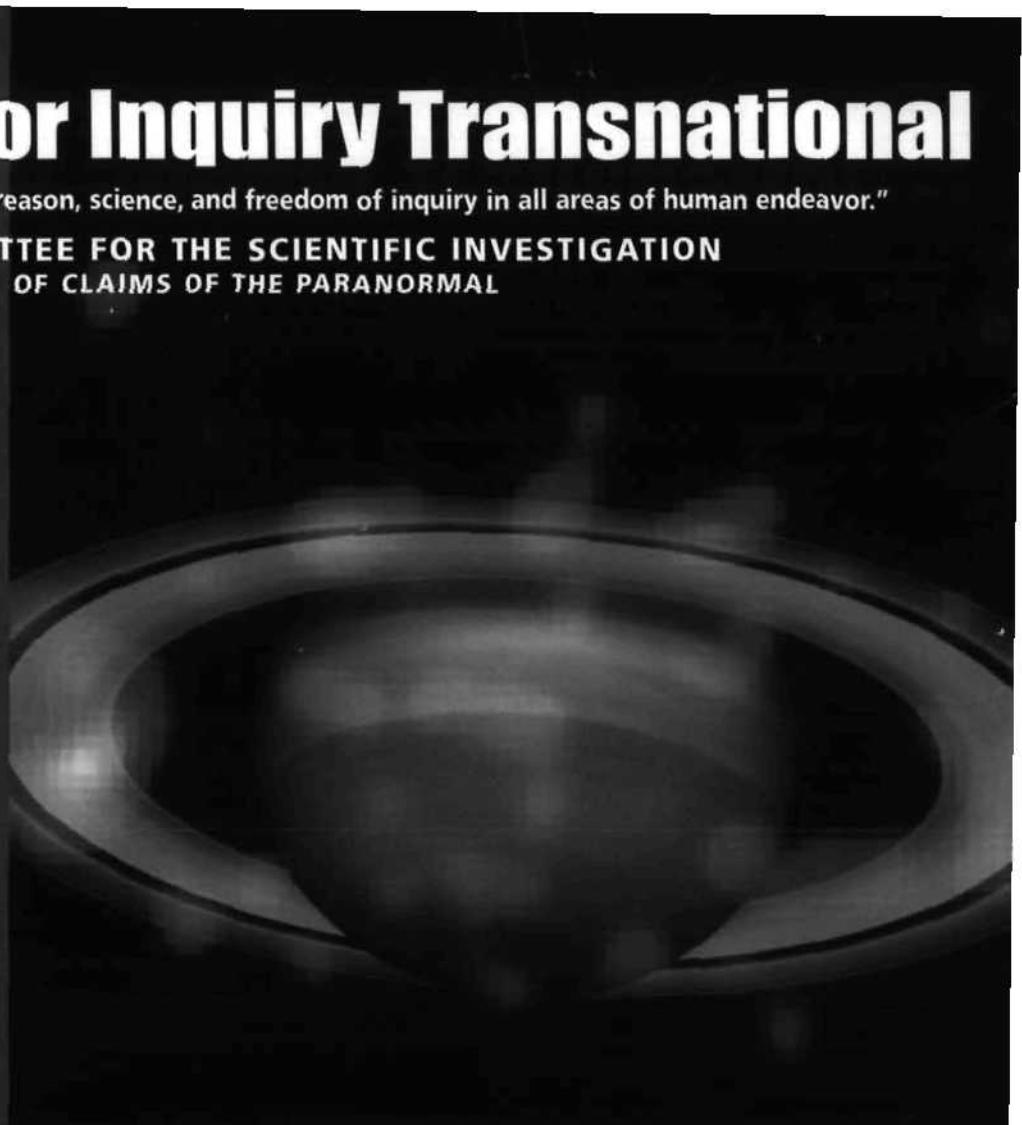

Saturn's Rings Sparkle with X-rays

These images from the Chandra X-Ray Observatory reveal that the rings of Saturn sparkle in X-rays (blue dots in this X-ray/optical composite). The likely source for this radiation is the fluorescence caused by solar X-rays striking oxygen atoms in the water molecules that comprise most of the icy rings.

As the image shows, the X-rays in the ring mostly come from the B ring, which is about 25,000 kilometers wide and is about 40,000 kilometers (25,000 miles) above the surface of Saturn (the bright white inner ring in the optical image). There is some evidence for a concentration of X-rays on the morning side (left side, also called the East ansa) of the rings. One possible explanation for this concentration is that the X-rays are associated with optical features called spokes, which are largely confined to the dense B ring and most often seen on the morning side.

Credit: X-ray: NASA/MSFC/CXC/A. Bhardwaj et al.; Optical: NASA/ESA/STScI/AURA